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ORIGINAL RESEARCH PAPER

The lichenicolous fungi of the South Shetland Islands, Antarctica: species diversity and identification guide

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Abstract

This paper contributes 96 species to the biota of lichenicolous fungi in the South Shetland Islands archipelago. New to science are the following genera: *Antarctosphaeria* Alstrup & Olech, gen. nov., *Dahawkswia* Alstrup & Olech, gen. nov., *Lichenohostes* Alstrup & Olech, gen. nov., *Llanorella* Alstrup & Olech, gen. nov., *Phaeosporodendron* Alstrup & Olech, gen. nov., and *Prostratomyces* Alstrup & Olech, gen. nov. Additionally, 31 species are described as new to science. These are: *Antarctosphaeria bireagens* Alstrup & Olech, sp. nov., *A. lichenicola* Alstrup & Olech, sp. nov., *Arthonia dufayelensis* Alstrup & Olech, sp. nov., *A. livingstonensis* Alstrup & Olech, sp. nov., *A. massalongiae* Alstrup & Olech, sp. nov., *A. pertusariicola* Alstrup & Olech, sp. nov., *A. rakusae* Alstrup & Olech, sp. nov., *Carbonea austroshetlandica* Alstrup & Olech, sp. nov., *Cercidospora pertusariicola* Alstrup & Olech, sp. nov., *Dactylospora antarctica* Alstrup & Olech, sp. nov., *D. haematommatis* Alstrup & Olech, sp. nov., *Dahawkswia lichenicola* Alstrup & Olech, sp. nov., *Dendrophoma acarosporae* Alstrup & Olech, sp. nov., *Didymellopsis antarctica* Alstrup & Olech, sp. nov., *Lichenohostes citrinospora* Alstrup & Olech, sp. nov., *Lichenostigma corymbosae* Alstrup & Olech, sp. nov., *Llanorella ramalinae* Alstrup & Olech, sp. nov., *Metasphaeria verrucosa* Alstrup & Olech, sp. nov., *Micarea lichenicola* Alstrup & Olech, sp. nov., *Phaeospora antarctica* Alstrup & Olech, sp. nov., *P. convolutae* Alstrup & Olech, sp. nov., *Phaeosporodendron badiae* Alstrup & Olech, sp. nov., *Phoma acarosporae* Alstrup & Olech, sp. nov., *Prostratomyces leprariae* Alstrup & Olech, sp. nov., *P. ochrolechiae* Alstrup & Olech, sp. nov., *P. rhizocarpicolae* Alstrup & Olech, sp. nov., *Rhagadostoma antarctica* Alstrup & Olech, sp. nov., *Sphaerellothecium placopsiicola* Alstrup & Olech, sp. nov., *Stigmidium placopsiicola* Alstrup & Olech, sp. nov., *Taeniolella frigidae* Alstrup & Olech, sp. nov., and *Tetramelas caloplacae* Alstrup & Olech, sp. nov. Furthermore, a literature survey was undertaken, which resulted in the preparation of an identification guide for the lichenicolous species occurring in the South Shetlands Islands.

Keywords

taxonomy; new taxa; lichen; maritime Antarctica

Introduction

On the basis of climatic and biotic features, the austral polar region is subdivided into three zones, including the sub-Antarctic, maritime Antarctic, and continental Antarctic [1]. The South Shetlands Islands belong to the maritime Antarctic, together with the South Orkney Islands, the South Sandwich Islands, Bouvetoya, and the west

coast of the Antarctic Peninsula. The South Shetland Islands archipelago consists of 11 major and several smaller islands; the largest of these are King George, Nelson, Robert, Greenwich, Livingston, Elephant, and Deception Islands. The archipelago lies almost 770 km south-east of Cape Horn (South America), and approximately 160 km north of the Antarctic Peninsula. The South Shetland Islands have a cold, moist, oceanic climate, with mean monthly temperatures exceeding 0°C for 1–4 months/year. The precipitation is 350–500 mm per annum of equivalent rainfall [2]. Most of the precipitation falls as snow, much of which melts in the summer, leaving snow-free areas.

More than 90% of the maritime Antarctic is covered by ice. The vegetation is poorly developed, and its occurrence is limited to coastal areas. There are only two native species of flowering plant: Antarctic hair grass, *Deschampsia antarctica* Desv., and Antarctic pearlwort, *Colobanthus quitensis* (Kunth) Bartl. The tundra consists almost exclusively of cryptogamic organisms, mainly lichens (lichenized fungi) and bryophytes, as well as prokaryotic (Cyanobacteria) and eukaryotic algae. Lichens play an important role in the Antarctic terrestrial ecosystem and are well-studied. The biota of lichens in the Antarctic and sub-Antarctic South Georgia reaches at least 500 species [3,4].

However, apart from lichens, a relatively common group of organisms comprises lichenicolous fungi. These are organisms that occur exclusively on lichens, most commonly as host-specific parasites, but also as pathogens, saprotrophs, or commensals. Data on the biodiversity of lichenicolous fungi in the Antarctic region are still insufficient. The first flora of Antarctic lichens, including lichenicolous fungi, published by Dodge [5] caused more harm than good in terms of taxonomy of this group [6,7]. Hawksworth and Iturriaga [8] made revisions of the species collected by Dodge, while Triebel [9], Rambold and Triebel [10], and Grube and Hafellner [11] revised selected groups of lichenicolous fungi. Studies of lichenicolous fungi in Antarctica were carried out by Fletcher et al. [12], Olech and Alstrup [13], Øvstedal and Hawksworth [14], Pegler et al. [15], Vainio [16], Selbmann et al. [17], and Hawksworth [18].

Lichenicolous fungi from the South Shetland Islands have previously been studied by Alstrup [19], Aptroot and van der Knaap [20], Möller and Gams [21], Olech and Alstrup [22], Olech [6], and Olech and Søchting [23].

The main objective of this paper was to identify lichenicolous fungi collected during several Polish expeditions to the South Shetland Islands, as well as to prepare a taxonomical key for lichenicolous fungi identification in this region, including the newly described species.

Material and methods

The material studied herein was collected by the second author during several Polish Antarctic expeditions of the Polish Academy of Science (1986–1988, 1989/90, 1991–1993, 1995/1996, 2001/2002, 2005/2006, 2006/2007, and 2008/2009). The collections are deposited in the Herbarium of the Institute of Botany, Jagiellonian University (KRA), with some duplicates mentioned in the list of species, which are housed in the Botanical Museum of the University of Copenhagen (C).

The first stage of lichenicolous fungi identification included determination of their hosts. Subsequently, species occurring on lichen surfaces were investigated. Sections of lichenicolous fungi were cut under a dissection microscope and studied under a light microscope at up to 1,000× magnification. Iodine reactions were performed with Lugol before and after pretreatment with 10% KOH. The taxonomical nomenclature followed the Index Fungorum (http://www.indexfungorum.org).

Results

Altogether, 96 species of lichenicolous fungi are reported from the South Shetland Islands. In the studied materials, six new genera and 31 new species are reported and described, which is more than one-third of the known species. Below, a list with descriptions of newly reported lichenicolous fungi species is presented. Species descriptions are short

and emphasize only diagnostic features that are critical for their recognition. Locations of species outside the South Shetland Islands are given in brackets.

On the basis of collected materials and a literature survey, an identification guide to lichenicolous fungi of the maritime Antarctic was compiled.

Key to the lichenicolous fungi known from the South Shetland Islands

1 Reproducing by ascospores, conidiospores produced or not **2**
Reproducing by conidiospores, ascospores not produced **86**

2 Ascomata perithecioid **3**
Ascomata discoid **52**

Perithecioid fungi

3 Ascomata blue-green to yellow-green, asci multispored, ascospores simple, hyaline, on *Polyblastia gothica* Th. Fr. ..... ***Thelocarpon cyaneum***
Ascomata dark brown to black **4**

4 Ascomata with dark setae, ascospores hyaline, one-septate, 4–8 × 1–2 µm, on *Cladonia* P. Browne ..... ***Niesslia cladoniicola***
Ascomata without dark setae **5**

5 Hymenium covering the entire internal surface of the ascomata, asci functionally unitunicate, narrowly clavate to cylindrical **6**
Hymenium restricted to the base of ascomata **7**

6 Exciple brownish, K+ red, hymenium K–, ascospores simple, hyaline, 11–13 × 2.5–3 µm, on *Bacidia stipata* I. M. Lamb and *Lecania brialmontii* (Vain.) Zahlbr ..... ***Antarctosphaeria lichenicola***
Exciple brownish, K+ bright green, hymenium K+ red (soluble), ascospores three-septate, 17–21 × 4–6 µm, on *Amandinea petermannii* (Hue) Matzer, H. Mayrhofer & Scheid ..... ***Antarctosphaeria bireagens***

7 Ascomata catathecia, ascospores one–three-septate, 14–17 × 4–4.5 µm, on *Leptogium puberulum* Hue ..... ***Lichenopeltella leptogii***
Ascomata perithecia **8**

8 Ascomata aggregated, covered by a common clypeus, ascospores brown, one-septate **9**
Ascomata dispersed or aggregated, without a common clypeus **10**

9 Ascospores 14–18 × 7–10 µm, on *Placopsis* Nyl., (Bouvetøya) ..... ***Clypeococcum placopsiiphilum***
Ascospores 8–10 × 5–7 µm, on *Buellia* De Not., (Bouvetøya) ..... ***Clypeococcum epimelanostolum***

10 Exciple thick and rough-walled **11**
Exciple thin and smooth-walled **14**

11 Ascospores hyaline, one-septate, 37–50 × 6–7.5 µm, on *Psoroma hypnorum* (Vahl) Gray ..... ***Rhagadostoma antarctica***
Ascospores brown, three-septate or muriform **12**

12 Ascomata aggregated, asci cylindrical, ascospores submuriform, 21–25 × 16–18 µm, on *Placopsis macrophthalma* (Hook. f. & Taylor) Nyl., [syn. *Lecanora* "*macrophtalma*" (Hook. f. & Taylor) Nyl.], Kerguelen (poorly known species) ..... ***Verrucaria congestula***
Ascomata united in a basal stroma, ascospores three-septate, each cell with a pore **13**

13 Ascospores 16.5–18 × 6.5–9 µm, on *Lecanora alpigena* (Ach.) Cl. Roux, [syn. *L. polytropa* (Ehrh.) Rabenh.] ..... ***Lasiosphaeriopsis lecanorae***
Ascospores 30–45 × 10–12 µm, on *Stereocaulon* (Schreb.) Schrad. ..... ***Lasiosphaeriopsis stereocaulicola***

14 Ascomata sessile on a black reticulate mycelium, ascospores one-septate **15**
Ascomata not sessile on a black mycelium **21**

15 Ascomata stromatic, irregular, to 150 µm diam., without ostiole, ascospores kidney-shaped, dark brown, one-septate, 25–28 × 11–13 µm, on *Catillaria corymbosa* (Hue) I. M. Lamb ..... ***Lichenostigma corymbosae***
Ascomata not stromatic, ascospores dark brown, hyaline or greyish **16**

16 Ascospores dark brown, one-septate, on *Buellia* (insufficiently known species) ..... ***Sphaerellothecium buelliae***
Ascospores hyaline or greyish **17**
17 Ascospores three-septate, 9.5–10.5 µm, on *Placopsis contortuplicata* I. M. Lamb ..... ***Sphaerellothecium placopsiicola***
Ascospores one-septate **18**
18 Ascomata partly immersed, 45–70 µm diam., ascospores hyaline, 9–12.5 × 3–4.5 µm, on *Cladonia* spp. ***Sphaerellothecium cladoniae***
Ascomata and mycelium superficial on host **19**
19 Ascomata 30–50 µm diam., ascospores becoming greyish as old, 9–13 × 4.5–5 µm, on *Ochrolechia* A. Massal. and *Pertusaria* DC. ..... ***Sphaerellothecium araneosum***
Ascomata on macrolichens **20**
20 Ascomata 60–80 µm diam., ascospores hyaline, 9–13 × 3–5 µm, on *Sphaerophorus globosus* (Huds.) Vain. ..... ***Sphaerellothecium minutum***
Ascomata on *Stereocaulon* (Schreb.) Schrad. ..... ***Sphaerellothecium stereocaulorum***
21 Ascospores dark brown **22**
Ascospores hyaline **28**
22 Asci polyspored, ascospores one-septate, small **23**
Asci four–eight-spored, ascospores bigger **24**
23 Ascospores 5–8 × 2–4 µm, hymenium I+ blue, on multiple hosts (Victoria Land) ..... ***Muellerella lichenicola***
Ascospores 6–10 × 4–5.5 µm, hymenium I–, on multiple hosts ..... ***Muellerella pygmaea***
24 Interascal mycelium present **25**
Interascal mycelium absent **40**
25 Ascospores one-septate **26**
Ascospores three-septate to submuriform **27**
26 Ascospores rough-walled, 12–16 × 4–7 µm, on *Caloplaca* Th. Fr., *Gondwania* Søchting, Frödén & Arup and *Xanthoria* (Fr.) Th. Fr. ..... ***Polycoccum rugulosarium***
Ascospores smooth-walled, 15–18.5 × 8–10 µm, on *Lecidea* Ach., Greenwich Island ..... ***Polycoccum follmannii***
27 Ascospores three-septate ca. 22 × 5 µm, on *Caloplaca*, (Macquarie Island). Insufficiently known taxa ..... ***Weddellomyces gasparriniae***
Ascospores three-septate to submuriform, 24–27 × 9–11 µm, on *Ochrolechia* ..... ***Pseudopyrenidium tartariicola***
28 Ascospores nonseptate **29**
Ascospores hyaline, septate **30**
29 Asci unitunicate, cylindrical, eight-spored. Ascospores uniseriate, simple, globose to broadly ellipsoid, 6.5–7.5 × 6–6.5 µm, on *Ochrolechia parella* (L.) A. Massal. ..... ***Dahawkswia lichenicola***
Asci bitunicate, clavate, ascospores ellipsoid to spiniform, 9–12 × 3–4 µm, on *Catapyrenium daedaleum* (Kremp.) Stein. ..... ***Epibryon conductrix***
30 Ascospores one-septate **31**
Ascospores three-septate to submuriform **35**
31 Ascospores with rough wall **32**
Ascospores smooth-walled **34**
32 Ascospores 14–22 × 6–10 µm, on *Candelariella* Müll. Arg. and *Lecanora* Ach. ..... ***Zwackhiomyces lecanorae***
Ascospores smaller **33**
33 Ascospores 11.5–14.5 × 3.5–5 µm, on *Porpidia* Körb. ..... ***Zwackhiomyces martinatianus***
Ascospores 12–19 × 3–5 µm, on *Cladonia*, (Macquarie Island) ..... ***Zwackhiomyces cladoniae***
34 Ascospores 16–19 × 5–6 µm, on *Megaspora verrucosa* (Ach.) Hafellner & V. Wirth ..... ***Cercidospora verrucosaria***
Ascospores 14–18 × 4–6 µm, on *Lecanora alpigena* (Ach.) Cl. Roux ..... ***Cercidospora epipolytropa***

35 Ascospores submuriform, 18–30 × 10–12 µm, on *Cladonia* ..... ***Protothelenella santessonii***
Ascospores three-septate **36**
36 Asci broadly clavate, ascospores halonate, 15–23 × 4–6 µm, on *Pertusaria* ..... ***Sagediopsis campsteriana***
Asci narrowly clavate to subcylindrical, ascospores three-septate, not halonate **37**
37 Ascospores guttulate, 45–52 × 15–18 µm, on *Megaspora verrucosa* ..... ***Metasphaeria verrucosae***
Ascospores not distinctly guttulate, much smaller **38**
38 Ascospores 14–16 × 5–6 µm, on *Acarospora macrocyclos* Vain. ..... ***Didymellopsis antarctica***
Not on *Acarospora macrocyclos* **39**
39 Ascospores 22–31(–35) × 7–8 µm, on *Lepra corallophora* (Vain.) Hafellner (syn. *Pertusaria corallophora* Vain.) ..... ***Cercidospora pertusariicola***
Ascospores 13–15 × 3–4 µm, on *Lecania brialmontii* ..... ***Stigmidium* sp. 1**
40 Ascospores dark brown **41**
Ascospores hyaline or greyish as mature **44**
41 Ascospores submuriform, 8–36 × 4–15 µm, on *Cladonia* cfr. *borealis* S. Stenroos ..... ***Merismatium nigritellum***
Ascospores septate **42**
42 Ascospores one-septate, thick-walled, 13–16 × 6–7.5 µm, on *Rhizocarpon geminatum* Körb. ..... ***Endococcus rugulosus***
Ascospores one-septae, 8–5–12.5 µm long **43**
43 Ascospores thick-walled, smooth-walled, 8.5–12.5 × 5–7 µm, on *Buellia* and *Porpidia* ..... ***Endococcus propinquus***
Ascospores thick-walled, asperulate ornamented at 1,500×, 9.5–11.2(–12) × 5–6.5 µm, on *Buellia*, (Queen Mary Land) ..... ***Endococcus matzeri***
44 Ascospores pale grey-brown as mature **45**
Ascospores hyaline **47**
45 Hymenium K/I+ blue, ascospores one–three-septae, 12.5–15.5 ×5.5–6 µm, on *Rinodina olivaceobrunnea* C. W. Dodge & G. E. Baker ..... ***Phaeospora antarctica***
Hymenium not K/I+ blue, ascospores three-septate **46**
46 Ascospores pale grey to medium brown, 11–13.5 × 3–3.5 µm, on *Acarospora convoluta* Darb. ..... ***Phaeospora convolutae***
Ascospores greyish, 15.5–18 × 5–7 µm, on *Lecania gerlachei* (Vain.) Darb. ..... ***Phaeospora subantarctica***
47 Ascospores simple, with pointed ends, 16–21 × 5–6 µm, on *Leptogium* (Ach.) Gray ..... ***Obryzum corniculatum***
Ascospores one–three-septate **48**
48 Ascospores one-septate, 16–19.5 × 4.5–5.5 µm, on *Placopsis contortuplicata* ..... ***Stigmidium placopsiicola***
Ascospores smaller **49**
49 Asscospores 8–12 × 4–5 µm, on *Acarospora* A. Massal. ..... ***Stigmidium fuscatae***
On macrolichens **50**
50 On *Stereoculon* ***Stigmidium beringicum***
On foliose lichens **51**
51 Ascospores 7.5–9 × 3–3.5 µm, on *Physcia caesia* (Hoffm.) Hampe ex Fürnr., (Marie Byrd Land) ..... ***Stigmidium pumilum***
Ascospores 12.5–14 × 3.5–4 µm, on *Peltularia austroshetlandica* (Øvstedal & Søchting) P. M. Jørg. (syn. *Parmeliella austroshetlandica* Øvstedal & Søchting) ..... ***Stigmidium* sp. 2**

Discomycetes

52 Ascospores dark brown, exciple present **53**
Ascospores hyaline, exciple present or absent **59**
53 Tholus I+ blue **54**
Tholus I– **55**
54 Ascospores two–two-septate, 16–23 × 6–9 µm, on *Physcia caesia* ..... ***Tetramelas pulverulentus***

Ascospores one-septate, 15–19 × 8.5–10 µm, on *Caloplaca sublobulata* (Nyl.) Zahlbr. ***Tetramelas caloplacae***

55 Ascospores one–three-septate, 19–25 × 8.5–11 µm, on *Pertusaria* ***Dactylospora rostrupii***
Ascospores one-septate, smaller **56**

56 Paraphyses without dark cap, ascospores thick-walled, 6.5–8 × 4 µm, on *Lecidea* ***Dactylospora antarctica***
Paraphyses with dark cap, ascospores bigger **57**

57 Ascospores 9.5–11.5 × 4.5–5.5 µm, on *Poeltidea* Hertel & Hafellner ***Dactylospora australis***
Ascospores bigger, not on *Poeltidea* **58**

58 Asci 33–36 × 14–15 µm, ascospores 13–15 × 6–8 µm, on *Caloplaca* ***Dactylospora dobrowolskii***
Asci 48.5–52 × 17.5–19.5 µm, ascospores 13–14 × 8.5–10 µm, on *Haematomma erythromma* (Nyl.) Zahlbr. ***Dactylospora haematommatis***

59 Ascospores not septate **60**
Ascospores septate **68**

60 Exciple absent or indistinct **61**
Exciple distinct **62**

61 Ascomata irregular in outline, ascospores 12–14.5 × 5.5–6 µm, gall-inducing, on *Usnea* Dill. ex Adans. ***Phacopsis usneae***
Ascomata regular apothecia, not gall-inducing, ascospores 11–14 × 3.5–4.5 µm, on *Lepra corallophora* (syn. *Pertusaria c.*) ***Micarea lichenicola***

62 Exciple with marginal setae, ascospores 7–8 × 3–4 µm, on *Tephromela atra* (Huds.) Hafellner ***Skyttea elachistosphora***
Exciple without marginal setae **63**

63 Ascomata with central umbo, epihymenium hyaline or greyish, ascospores 11–13 × 6–8 µm, on *Diomedella disjungenda* (Cromb.) Hertel [syn. *Lecanora d.* (Cromb.) Hertel & Rambold], (Kerguelen and Marion Islands) ***Carbonea superjecta***
Ascomata without central umbo, epihymenium brownish, greenish or bluish **64**

64 Hypothecium pale brownish **65**
Hypothecium dark brown **67**

65 Ascospores globose, 5–9 µm diam., epithecium yellow to brown, on *Ochrolechia frigida* (Sw.) Lynge ***Geltingia associata***
Ascospores ellipsoid **66**

66 Ascospores 7–13 × 4–8 µm, on *Candelariella* ***Carbonea vitellinaria***
Ascospores 6–8 × 3–4.5 µm, on *Pseudephebe minuscula* (Nyl. ex Arnold) Brodo & D. Hawksw., (Marie Byrd Land) (insufficiently known species) ***Carbonea antarctica***

67 Parasitic to saprophytic species, hymenium I+ blue, ascospores 9–10 × 3.5–4.5 µm, on *Carbonea assentiens* (Nyl.) Hertel and *Rhizocarpon geographicum* (L.) DC ***Carbonea austroshetlandica***
Parasymbiontic species, hymenium I–, ascospores 10–12 × 3–4 µm, on *Rhizoplaca aspidophora* a (Vain.) Follmann and *Lecanora alpigena* ***Carbonea aggregantula***

68 Ascopores polardiblastic, ascomata orange **69**
Ascospores not polardiblastic, septate, ascomata black **70**

69 Ascospores 15–17 × 7–9 µm, septum 4–6 µm, on *Buellia* ***Caloplaca buelliae***
Ascospores 10–12 × 7.5–8 µm, septum 3.5–5 µm, on *Psoroma* Ach. ex Michx., *Pannaria hookeri* (Borrer) Nyl., and *Yoshimuria cerussata* (Hue) S. Y. Kondr., Kärnefelt, Elix, A. Thell, Jung Kim, A. S. Kondr. & Hur [syn. *Huea cerussata* (Hue) C. W. Dodge & G. E. Baker] ***Caloplaca psoromatis***

70 Mycelium green-black, apothecia urceolate, ascospores pluriseptate, 80–110 × 3–5 µm, on *Cladonia* (only sterile material seen) ***Arthrorhaphis aeruginosa***
Mycelium not green-black, apothecia not urceolate, ascospores one(–two)-septate **71**

71 Exciple distinct, persistent, apothecia flat, ascospores 10–14 × 3–5 µm, on *Peltigera* Willd. ***Scutula epiblastemica***

Exciple indistinct or lacking **72**
72 Thallus crustose to subeffigurate **73**
Thallus absent **74**
73 Thallus crustose, verrucose, on *Lepraria* Ach. ..... ***Arthonia excentrica***
Thallus subeffigurate, on *Buellia* and *Amandinea* M. Choisy ..... ***Arthonia subantarctica***
74 Ascospores becoming brown when old; hymenium I+ blue, on *Lecanora alpigena* ..... ***Arthonia punctella***
Acarospores remaining colorless **75**
75 Hypothecium colorless **76**
Hypothecium brownish to dark brown **83**
76 Some ascomata on stipes; on *Umbilicaria* Hoffm. ..... ***Arthonia rufidula***
Ascomata not stipitate **77**
77 Parasitic on apothecia, rarely on thallus *Myriolecis dispersa* (Pers.) Śliwa, Zhao Xin & Lumbsch [syn. *Lecanora d.* (Pers.) Röhl.] ..... ***Arthonia galactinaria***
On thalli multiple hosts **78**
78 Hymenium I+ red **79**
Hymenium I+ orange **81**
79 Ascospores to 13 µm long constricted at septum; on *Physcia* (Schreb.) Michx., *Buellia*, *Amandinea* ..... ***Arthonia molendoi***
Ascospore 16 – 18 µm long **80**
80 Ascospores in range 11–16 × 4.5–6 µm, ascomata to 0.5 µm; on *Placopsis* Nyl. ..... ***Arthonia gelidae***
Ascospores in range 15–18 × 5.5–7 µm, ascomata to 0.3 µm; on *Amandinea* ..... ***Arthonia rakusae***
81 Ascospores in range 14.5–16 × 7–8 µm; on *Ochrolechia* ..... ***Arthonia* sp.**
Ascospores to 14 µm long **82**
82 Lower cell of ascospoeres slightly narrowed than the upper one **83**
Cells of ascospores equal; on *Leptogium* ..... ***Arthonia livingstonensis***
83 Paraphyses branched and anastomosed ascospores in range 12–14 µm long; on *Massalongia* Körb. ..... ***Arthonia massalongiae***
Paraphyses not on above, ascospores in range 11–12 µm long; on *Austroplaca cirrochrooides* (Vain.) Søchting, Frödén & Arup [syn. *Caloplaca cirrochrooides* (Vain.) Zahlbr.] ..... ***Arthonia dufayelensis***
84 Ascospores to 17 µm long; on *Physcia* ..... ***Arthonia destruens***
Ascospores mostly <13–15 µm long **85**
85 Hymenium I+ red, ascospores 9–15 × 3.5 µm; on *Physcia* ..... ***Arthonia epiphyscia***
Hymenium I+ orange, ascospores 11–13 × 3.5–4 µm; on *Lepra corallophora* (syn. *Pertusaria c.*) ..... ***Arthonia pertusariicola***

Conidial fungi

86 Not forming conidia, seen as green-black mycelial spots on *Cladonia*, apothecia not known from Antarctica ..... ***Arthrorhaphis aeruginosa***
Forming conidia **87**
87 Forming pink colonies in soralia of *Peltigera didactyla* (With.) J. R. Laundon, conidia globose 4–7 µm diam. ..... ***Illosporium roseum***
Colonies not pink **88**
88 Colonies white, conidia formed both from conidiomata and free hyphae, of varying shape, 4.5–9 × 2.5–3.5 µm ..... ***Tolypocladium ovalisporum***
Conidia formed either in conidiomata or on free hyphae **89**
89 Conidia formed in conidiomata **90**
Conidia formed on free hyphae or acervuli **97**
90 Conidiomata immersed, wall hyaline, conidia simple, citriniform, 9–12 × 7–8 µm, on *Placopsis contortuplicata* I. M. Lamb ***Lichenohostes citrinospora***
Conidiomata dark brown to black pycnidia **91**
91 Conidiopores absent, conidia straight, hyaline, 0.6 × 0.8 µm, on *Acarospora macrocyclos* ..... ***Phoma acarosporae***
Conidia globose to subglobose, dark brown **92**

92 Conidiophores branched, to ca. 50 × 2 µm, conidia formed in a row, ellipsoid, hyaline 2.5–3 × 1.5–2 µm, on *Acarospora macrocyclos* ..... ***Dendrophoma acarosporae***
Conidiophores much shorter or absent **93**

93 Conidiomata stromatic, conidia multicellular **94**
Conidiomata not stromatic, conidia simple or multicellular **95**

94 Outer pellicle absent, conidia of 10–15 cells, each cell 3–4 µm diam., on *Ochrolechia*, *Pertusaria* and *Lecania* A. Massal. ..... ***Lichenostigma alpinum*** (syn. *Phaeosporobolus alpinus*)
Outer pellicle present, conidial cells 4–6 µm diam., on macrolichens ..... ***Phaeosporobolus usneae***

95 Conidia multicellular, verrucosa, dark olivaceous green, formed on acervuli, 20–40 µm diam., cells 6–8 µm diam., on *Bellemerea subsorediza* (Lynge ex Å. E. Dahl) R. Sant. ..... ***Nigropuncta rugulosa***
Conidia simple, subglobose **96**

96 Conidiogenous cells 5–11 × 2–4 µm, conidia almost smooth-walled, 2–5 µm diam., on multiple hosts ..... ***Lichenoconium usneae***
Conidiogenous cells 4–8 × 2–4 µm, conidia rough-walled, 2–6 µm diam., on multiple hosts, Deception Island ..... ***Lichenoconium lecanorae***

97 Forming pink colonies in soralia of *Peltigera didactyla*, conidia globose, 4–7 µm diam ..... ***Illosporium roseum*** (syn. *Illosporium carneum*)
Mycelium and conidia pale or brown-black **98**

98 Mycelium and conidia white or hyaline **99**
Mycelium and conidia brown to black **100**

99 Conidiogenous cells 15–30 × 2 µm, conidia 3–6 × 1–3 µm, on multiple hosts, (South Orkney Islands) ..... ***Acremonium antarcticum***
Conidiogenous cells 20–70 × 0.8–2 µm, conidia 5–13.5 × 2–2.5 µm, on *Mastodia tessellata* (Hook. f. & Harv.) Hook. f. & Harv. [syn. *Turgidosculum complicatulum* (Nyl.) Kohlm. & E. Kohlm.] ***Acremonium psychrophilum***

100 Mycelium with conidiogenous cells internal in apothecia of multiple hosts, pale brown, conidia superficial, dark brown **101**
Mycelium or conidiophores superficial, dark brown to black **102**

101 Conidia one-septate, 5–9 × 4–7 µm, on *Candelariella vitellina* (Hoffm.) Müll. Arg. and *Rinodina olivaceobrunnea* C. W. Dodge & G. E. Baker ..... ***Intralichen christiansenii***
Conidia simple or rarely septate, ca. 5 µm diam., on multiple hosts ..... ***Intralichen* sp.**

102 Thalloconidia of up to 20 cells formed as free side-branches, cell rounded, 5–8 µm diam., on *Ramalina terebrata* Hook. f. & Taylor ..... ***Llanorella ramalinae***
Conidia not thalloconidia, simple or septate **103**

103 Mycelium forming upright pseudoparenchymatic, branched conidiophores of 2–3 rows of cells, apically forming thalloconidia of 3–10 cells, cells 6–10 × 4–8 µm, on *Protoparmelia badia* (Hoffm.) Hafellner ..... ***Phaeosporodendron badiae***
Mycelium prostrate or immersed **104**

104 Mycelium immersed, conidiophores upright, of single hyphae, conidiogenesis enteroblastic, conidia verruculose, mostly one-septate, 12–20 × 10–12 µm, on *Ochrolechia frigida* ..... ***Taeniolella frigidae***
Mycelium superficial, dark brown, forming conidia on short sidebranches, conidiogenesis enteroblastic, conidia thick-walled, verruculose **105**

105 Mycelium of cells 4.5–5.5 µm broad and 6–7.5 µm long, conidia breaking up in 2–3-celled units, on *Lepraria* ..... ***Prostratomyces leprarie***
Mycelium of rounded cells, conidia two-celled or three-celled **106**

106 Mycelial cells 3.5–5.5 µm diam., conidia mostly two-celled,11–11.5 × 6–6.5 µm, on *Ochrolechia parella* ..... ***Prostratomyces ochrolechiae***
Mycelial cells 7–8 µm diam., conidia two–three-celled, ca. 6 µm diam., on *Rhizocarpon geographicum* ..... ***Prostratomyces rhizocarpicolae***

A survey of the lichenicolous fungi of the South Shetland Islands

An asterisk (*) indicates a genus and species new to science.

Acremonium antarcticum (Speg.) D. Hawksw.

On multiple hosts: (South Orkney Islands).

Acremonium psychrophilum C. Möller & W. Gams

Isolated and described from *Mastodia tessellata* (syn. *Turgidosculum complicatulum*) from King George Island [21].

****Antarctosphaeria*** Alstrup & Olech, gen. nov.

Genus inter Phyllachorales referendum. Ascomata nigra, sessilia, ostiolata, parietibus intra omnino hymenia tectis. Paraphyses ramificatae, septatae. Asci anguste clavati, unitunicati. Ascosporae ellipsoideae, hyalinae.

Type species: *Antarctosphaeria lichenicola* Alstrup & Olech, described below.

Ascomata perithecioid, sessile, ostiolate, black. Hymenium covering the entire inner surface. Paraphyses branched and septate. Asci functionally unitunicate, narrowly clavate. Spores are released by breaking of the asci a little above the center. Ascospores ellipsoid, hyaline, simple or septate.

The new genus probably belongs in Phyllachorales. It resembles the monotypic genus *Thamnogalla* D. Hawksw. in having a hamathecium, in the asci and ascospores, but in that genus the ascomata are immersed in galls, the hymenium is confined to the bottom of the ascomata, and the paraphyses are unbranched.

****Antarctosphaeria bireagens*** Alstrup & Olech, sp. nov.

Differt in excipulum K+ colorem aerugineum insolubilem induens, hymenium eodem modo tractatem colorem rubrum solubilem. Ascosporae 3-septatae, 17–21 × 3.5–4 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Vauréal Peak, 40 m, on *Amandinea petermannii*, January 19, 1987, M. Olech (KRA-holotype). Paratypes, on *A. petermannii*: KING GEORGE ISLAND, Admiralty Bay: Ubocz, 70 m, January 27, 1987; Smok, 60 m, November 1, 1987.

Ascomata sessile, black, to 0.2 mm in diameter. Outer part of ascoma-wall of cells 6–8 µm diam., brownish, K+ bright green, inner layers of elongate cells 6–9 × 2–3 µm. Hymenium covering the entire inner surface, K+ red (soluble). Paraphyses branched, septate, with the apical cell slightly enlarged or not. Asci unitunicate, narrowly clavate, 57–63 × 7.5–8.5 µm. Ascospores eight, narrowly ellipsoid, three-septate, hyaline, 17–21 × 4–6.0 µm.

****Antarctosphaeria lichenicola*** Alstrup & Olech, sp. nov.

Ascomata ad 0.2 mm diam., dense congregata. Paries ascomatis circiter 30 µm crassus, pseudoparenchymaticus, ad basim K+ ruber. Hymenium J−. Paraphyses ca. 1.5 µm broad. Asci 35–38 × 7–8 µm magni, 8 spori. Ascosporae non septatae, 11–13 × 2.5–3 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Llano Point, S, 5 m, on the stem of fruticose *Bacidia stipata*, December 22, 1987, M. Olech (KRA-holotype). Paratype on *Bacidia stipata*: KING GEORGE ISLAND, Admiralty Bay: Ubocz, E, 90 m, December 16, 1987 (C).

Ascomata sessile, black, nitid, densely crowded but not stromatic, ostiolate, to 0.2 mm diam. The two outer layers of ascoma-wall of cells ca. 8 × 5 µm, inner layers of interwoven hyphae, outer layers brownish to greenish in section, paler inwards. Brownish parts especially situated at the base and K+ red (soluble). Hymenium covering the entire inner surface, I– and KI–. Paraphyses septate, rarely branched, anastomoses not seen, ca. 1.5 µm thick, a little longer than asci. Asci narrowly clavate, unitunicate, 35–38 × 7–8 µm, sessile on a basal cell ca. 8 × 3 µm. Ascospores eight, subcylindrical, nonseptate, hyaline, 11–13 × 2.5–3 µm.

Other collection, on *Lecania brialmontii*: KING GEORGE ISLAND, Admiralty Bay: Uchatka Point, February 3, 1987.

Arthonia destruens Rabenh.

On *Physcia caesia*: KING GEORGE ISLAND, Admiralty Bay: Shag Point, August 31, 1987.

****Arthonia dufayelensis*** Alstrup & Olech, sp. nov.

Ascomata sparsa vel congregata, ad 0.2 mm diam., nigra, nitida, paulum convexa. Subhymenium hyalinum. Hymenium circiter 35 µm altum, in summo dilute fuscidum, non K tractatum Lugol + aurantiacum, K tractatum Lugol + caeruleum, paraphysibus anastomosantibus, cellulis terminalis non fusco-calyptratis. Asci late clavati, 26–31 × 12–14 µm magni, octospori. Ascosporae uniseptatae, satis latae, cellula superiore inferiorum latitudine paulo superante, 11–12 × 4.5–5 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Dufayel Island, E coast of island, 5 m, on *Austroplaca cirrochoides* (syn. *Caloplaca cirrochrooides*), August 25, 1987, M. Olech (KRA-holotype).

Ascomata sessile, black, nitid, slightly convex, to 0.2 mm in diameter, dispersed to aggregated. Subhymenium hyaline, hymenium ca. 35 µm high, dilute brownish at top, I+ and KI+ orange. Paraphyses without a brown cap. Asci broadly clavate, 26–31 × 12–14 µm. Ascospores eight, hyaline, one-septate, the lower cell slightly narrower than the upper one, 11–12 × 4.5–5 µm.

Arthonia dufayelensis is a relatively mild parasite; the host becomes discolored only when it is half covered by the fungus.

Arthonia epiphyscia Nyl.

KING GEORGE ISLAND, Admiralty Bay: Shag Point, 5 m, August 31, 1987; Emerald Point, 5 m, February 3, 2002; Stenhouse Bluff, S, 40 m, November 22, 1987, all on *Physcia caesia*. Trzy Stawy, 40 m, on *Physcia dubia* (Hoffm.) Lettau, January 9, 2007.

Arthonia excentrica Th. Fr.

On *Lepraria*: KING GEORGE ISLAND, Admiralty Bay: near Arctowski Station, January 23, 1987; Kasprowy Hill, 20 m, August 1, 1987; Bystry Creek Valley, 40 m, January 8, 2007; Kasprowy Hill, 20 m, August 1, 1987; 60 m, November 1, 1987; Rescuers Hills, January 28, 1987; Uchatka Point, December 13, 1987; Demay Point, SE, 110 m, December 13, 1987; Puchalski Grave, E, 40 m, December 4, 1987; Smok, N, 60 m, November 1, 1987; moraine by the northern edge of Ecology Glacier, 50 m, January 28, 1987; Sphinx Hill, 155 m, December 8, 1987. LIVINGSTON ISLAND, Johnson's Dock area, Ballester Point, 10–15 m, January 8, 1988. PENGUIN ISLAND, above Gonzales Point, 30 m, January 29, 2009. Hala, 50 m, December 4, 1987. Marr Point, 10 m, January 1, 2007.
On *Lepraria*: KING GEORGE ISLAND, King George Bay: moraine of Polonia Glacier, 40 m, January 23, 2009.

Arthonia galactinaria Leight.

On *Myriolecis dispersa* (syn. *L. dispersa*): KING GEORGE ISLAND, King George Bay: Turret Oasis, above Mersey Point, 15 m, February 9, 2007; moraine of White Eagle Glacier, 100 m, January 15, 2009.

Arthonia gelidae R. Sant.

On *Placopsis contortuplicata*: KING GEORGE ISLAND, Admiralty Bay: Urbanek Crag, SW, 120 m, October 20, 1987; Stenhouse Bluff, 45 m, November 22, 1987.

****Arthonia livingstonensis*** Alstrup & Olech, sp. nov.

Ascomata interdum congregata, ad 0.8 mm diam., nigra, opaca, convexa. Subhymenium pallidum. Hymenium 40–45 µm altum, hyalinum, non K tractatum Lugol + aurantiacum, K tractatum Lugol + caeruleum. Epihymenium in sectione pallidum. Paraphyses ramificatae, anastomosantes, ab ascis difficiles separatu. Asci clavati, 35–40 × 10–12 µm magni, maximam diametrum prope apices attingentis, ad bases abrupte attenuati, 8 spori. Ascosporae ellipsoids polis rotundatis, 1septatae, cellulis paene aequalibus, 12–13 × 4.5–5.5 µm magnae.

Type: South Shetland Islands, LIVINGSTON ISLAND, Johnson's Dock area, on *Leptogium puberulum* Hue, January 11, 1988, M. Olech (KRA-holotype).

Ascomata convex, black, mat, 0.5–0.8 mm diam., sometimes aggregated. Subhymenium pale. Hymenium 40–45 µm high, I+ orange, KI+ blue. Epihymenium pale in section. Paraphyses branched and anastomosed without brown cap, difficult to separate from asci. Asci clavate with abruptly narrowed base, 35–40 × 10–12 µm. Ascospores eight, ellipsoid, one-septate, cells almost equal, 12–13 × 4.5–5.5 µm.

The new species is not a typical *Arthonia*, it is placed here pending a revision of the genus. It seems not to harm its host.

****Arthonia massalongiae*** Alstrup & Olech, sp. nov.

Ascomata sparsa, ambitu irregularia, circiter 0.5 mm diam., nigra, opaca. Subhymenium hyalinum vel pallide fuscidum. Hymenium 35–40 µm altum, hyalinum, non K tractatum Lugol + aurantiacum, K tractatum Lugol + caeruleum. Paraphyses ramificatae, anastomosantes, cellulis terminalibus 3–5 µm diam., ubique fuscidis, non obscurius calyptratis. Asci late clavati, 25–30 × 11–13 µm magni, 8 spori. Ascosporae anguste ellipsoides, 1septatae, cellula inferiore superiore manifesto angustiore, 12–14 × 3.5–4 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Keller Peninsula, moraine above Yellow Point, 50 m; Potter Peninsula: Three Brothers Hill, 60 m, January 30, 2007, on *Massalongia olechiana* Alstrup & Søchting, March 5, 1987, M. Olech (KRA-holotype). Paratypes, on *M. olechiana*: LIVINGSTON ISLAND, Johnson's Dock area, Sophia Regina Hill, 30 m, January 11, 1988 (C).

Ascomata dispersed, black, mat, slightly irregular, to ca. 0.3 mm diam. Subhymenium hyaline. Hymenium 65–70 µm high, I+ orange, KI+ blue. Paraphyses branched, anastomosed, apical cells 3–5 µm diam., brownish but not with dark cap. Asci broadly clavate, ca. 50 × 20 µm. Ascospores eight, hyaline, one-septate, 12–14 × 4–5 µm, the lower cell distinctly narrower than the upper one.

No *Arthonia* species has so far been reported on *Massalongia*. On other species of Pannariaceae, only *A. epifarinosa* Etayo and *Homostegia pelvetii* (Hepp ex Linds.) Cooke [syn. *Artonia p.* (Hepp ex Linds.) H. Olivier] have been reported on *Pannaria*.

Arthonia molendoi (Heufl. ex Frauenf.) R. Sant.

On *Physcia caesia*: PENGUIN ISLAND, near Crater Lake, N, 40 m, January 26, 2009.

On *Physcia dubia*: KING GEORGE ISLAND, Admiralty Bay: Patelnia, 20 m, January 2, 2009; Demay Point, SE, 10 m, December 13, 1987; Rescuers Hills, N, 30 m, January 22, 1988. King George Bay: Lions Rump, February 1, 1990. Potter Peninsula: Three Brothers Hill, 60 m, December 18, 2005. PENGUIN ISLAND, central cone, January 1, 2007. On *Physcia*: KING GEORGE ISLAND, Admiralty Bay: Stenhouse Bluff, S, 10 m, November 22, 1987 (KRA).

****Arthonia pertusariicola*** Alstrup & Olech, sp. nov.

Ascomata congregata, convexa, circiter 0.2 mm diam., nigra. Subhymenium cinereo-fuscum. Hymenium 35–40 µm altum, hyalinum, K+ achroum, non K tractatum Lugol + aurantiacum, K tractatum Lugol + caeruleum. Paraphyses ramificatae, anastomosantes, cellulis terminalibus 3–5 µm diam., fusco- vel nigro-calyptratis. Asci late pyriformes, 30–35 × 12–15 µm magni, 8 spori. Ascosporae ellipsoides, 1 septatae, cellula inferiore superiore angustiore, 11–13 × 3.5–4 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Panorama, 30 m, on *Lepra corallophora* (syn. *Pertusaria c.*), August 4, 1987, M. Olech (KRA-holotype).

Ascomata aggregated, convex, black, mat/nitid, ca. 0.2 mm diam. Subhymenium grey-brown. Hymenium 35–40 µm high, hyaline, I+ orange, KI+ blue. Paraphyses with enlarged apical cells and dark brown caps. Asci broadly pyriform, 30–35 × 12–15 µm. Ascospores hyaline, one-septate, ellipsoid, the lower cell narrower than the upper one, 11–13 × 3.5–4 µm.

The species is strongly parasitic, totally destroying the thallus of the host. No species of *Arthonia* was so far known on *Pertusaria* or *Ochrolechia*.

Arthonia cfr. ***punctella*** Nyl.

Subhymenium and epihymenium dark brown. Hymenium brownish, I+ orange, KI+ blue.

Paraphyses not enlarged at apex, brownish. Asci ca. 30–35 × 15–18 µm, cytoplasma KI+ orange. Ascospores eight, ellipsoid with rounded ends, one-septate, not or slightly constricted at septa, lower cell a little narrower, 13–16.5 × 5–6 µm, hyaline with dark spots (punctate).

On *Lecanora alpigena*: KING GEORGE ISLAND, Admiralty Bay: Ubocz, 150 m, January 15, 1990. Upłaz, S, 60 m, April 16, 1987 (C).

****Arthonia rakusae*** Alstrup & Olech, sp. nov.

Ascomata semi-immersa, congregata, plana vel convexa, 0.2–0.3 mm diam., nigra, opaca vel subnitida. Subhymenium pallide fuscidum. Hymenium 60–65 µm altum, hyalinum, Lugol + rubrum, K tractatum Lugol + caeruleum. Paraphyses ramificatae, anastomosantes, 2–3 µm crassae, cellulis terminalibus haud vel paulum incrassatis, fusco-calyptratis. Asci ellipsoides, 45–50 × 14–16 µm magni, octospori. Ascosporae ellipsoides, 1-septatae, cellula inferiore superiore angustiore, 15–18 × 5.5–7 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Rakusa Point, on *Amandinea petermannii*, April 22, 1987, M. Olech (KRA-holotype). Paratypes: same locality and host, January 20, 1987, and April 14, 1987 (C). Paratypes, all on *A. petermannii*: KING GEORGE ISLAND, Admiralty Bay: Patelnia, 20 m, January 16, 2006; Upłaz, April 16, 1987.

Etymology: The species is named in honor of Prof. Stanisław Rakusa-Suszczewski, who established the Polish Antarctic Station Arctowski.

Ascomata semi-immersed, aggregated, flat to convex, black, mat to subnitid, 0.2–0.3 mm in diameter. Subhymenium pale brownish. Hymenium hyaline, 60–65 µm high, I+ red, KI+ blue. Paraphyses 2–3 µm thick, apical cells not or slightly enlarged, brown-capped. Asci ellipsoid, 45–50 × 14–16 µm. Ascospores eight, hyaline, one-septate, the lower cell slightly narrower than the upper one, 15–18 × 5.5–7 µm.

The species is parasitic, turning the host thallus grey.

Arthonia rufidula (Hue) D. Hawksw., R. Sant. & Øvstedal

On *Umbilicaria africana* (Jatta) Krog & Swinscow: KING GEORGE ISLAND, Admiralty Bay: Jersak Hills, N, 90 m, February 9, 1990.
On *U. antarctica* Frey & I. M. Lamb: KING GEORGE ISLAND, Admiralty Bay: Siodło, 100 m, February 11, 1990. King George Bay: Turret Point, 10 m, January 22, 2009; Tatur Hill, 40 m, January 21, 2009; PENGUIN ISLAND, Gonzales Point, January 29, 2009.
On *U. decussata* (Vill.) Zahlbr.: KING GEORGE ISLAND, Admiralty Bay: Demay, 120 m, December 10, 1987; Sphinx Hill, N, 140 m, December 8, 1987.

Arthonia subantarctica Øvstedal

On *Amandinea babingtonii* (Hook. f. & Taylor) Søchting & Øvstedal: KING GEORGE ISLAND, Admiralty Bay: Vauréal Peak, N, 20 m, January 19, 1988.
On *Buellia*: KING GEORGE ISLAND, Admiralty Bay: Rescuers Hills, 50 m, December 22, 1987. PENGUIN ISLAND, above Crater Lake, E, 40 m, January 26, 2009. LIVINGSTON ISLAND, Pepita Beach: 3 m, January 9, 1988.

Øvstedal [24] described the species from Bouvetøya as a lichenized *Arthonia*, but Alstrup [19] found the thallus to be *Amandinea babingtonii* and lectotypified it on the lichenicolous fungus. Other reports of the species from King George Island by Olech [6] do not belong here. The species was also reported from Deception Island by Aptroot and van der Knaap [20] who did not notice its lichenicolous nature.

Arthonia sp.

Ascomata irregular, black, mat. Subhymenium pale brownish. Hymenium hyaline I+ orange, KI+ blue. Paraphyses 2.5–3 µm thick, enlarged at apex to 5–6 µm and dark-capped. Asci ca. 40 × 18 µm. Ascospores eight, 14.5–16 × 7–8 µm, ends rounded, one-septate, slightly constricted at septa, lower cell narrower.

On *Ochrolechia frigida*: KING GEORGE ISLAND, King George Bay: Tatur Hill, 47 m, January 22, 2009.

Arthrorhaphis aeruginosa R. Sant & Tønsberg

On *Cladonia borealis*: KING GEORGE ISLAND, Fildes Penninsula: Fossil Hill, 10 m, January 12, 1988. Admirallity Bay: Demay Point, 30 m, January 18, 1990.
On *C. cariosa* (Ach.) Spreng.: KING GEORGE ISLAND, King George Bay: Turret Point, leg B. Jabłonski, January 22, 1981.
On *C. chlorophaea* (Flörke ex Sommerf.) Spreng.: KING GEORGE ISLAND, Admiralty Bay: Demay Point, 150 m, February 2, 1987.
On *Cladonia*: KING GEORGE ISLAND, Admiralty Bay: Rescuers Hill, 50 m, January 6, 1990. PENGUIN ISLAND, rock near petrel's colony, 20 m, December 31, 2006.

Caloplaca buelliae Olech & Søchting

Parasitic on *Buellia*. Localities given by Olech [6].

Caloplaca psoromatis Olech & Søchting

KING GEORGE ISLAND, Admiralty Bay: Keller Peninsula, 40 m, on Yoshimuria cerussata (syn. *Huea c.*), March 2, 1987. This is a new host for the species, which has earlier been reported on *Psoroma* and *Pannaria hookeri* [23].

Carbonea aggregantula (Müll. Arg.) Diederich & Triebel

On *Lecanora alpigena*: KING GEORGE ISLAND, Admiralty Bay: moraine at northern edge of Ecology Glacier, 50 m, January 15, 1990; Jersak Hills, E, 190 m, November 30, 1987; Stenhouse Bluff, 50 m, November 22, 1987. PENGUIN ISLAND, S, 10 m, December 30, 2006; at Deakon Peak, 40 m, January 27, 2001. LIVINGSTON ISLAND, Johnson's Dock area, near Spanish station, January 11, 1988.
On *Rhizoplaca aspidophora*: KING GEORGE ISLAND, Admiralty Bay: Penguin Ridge, October 8, 1987; Rocks near Blue Dyke, February 3, 1987; Upłaz, 50 m, April 16, 1987; 60 m, March 14, 1987. Ubocz, 70 m and 90 m, January 21, 1987; Vauréal Peak, 120 m, January 24, 2002.

****Carbonea austroshetlandica*** Alstrup & Olech, sp. nov.

Ascomata sparsa vel congregata, ad 0.3 mm diam., mox convexa margine tecto. Hypothecium et excipulum fuscum, epihymenium viridulum, hymenium K tractatum Lugol+ caeruleum, 35–48 µm altum. Asci late ellipsoidi, 28–32 × 15–16 µm magni, octospori. Ascosporae 9–10 × 3.5–4.5 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Demay Point, 200 m, on *Carbonea assentiens*, February 2, 1987, M. Olech (KRA-holotype, C-isotype).

Ascomata dispersed to aggregated, to 0.3 mm in diameter, abruptly becoming convex with excluded margin. Hypothecium and exciple dark brown, epihymenium greenish. Hymenium hyaline, KI+ blue, 35–48 µm high. Paraphyses branched and anastomosing, slightly enlarged at apex. Asci broadly ellipsoid, 28–32 × 15–16 µm. Ascospores hyaline, ellipsoid, simple, 9–10 × 3.5–4.5 µm.

Carbonea austroshetlandica is probably closely related to *C. aggregantula* (Müll. Arg.) Diederich & Triebel from which it differs in the hymenial reaction and in being parasitic to saprobic, not parasymbiotic.

Other collections, on *Rhizocarpon geographicum*: KING GEORGE ISLAND, Admiralty Bay: Hennequin Point, 40 m, January 30, 1990.

Carbonea superjecta (Nyl.) Hertel

On *Diomedella disjungenda* (syn. *Lecanora d.*), (Kerguelen and Marion Islands).

Carbonea vitellinaria (Nyl.) Hertel

On *Candelariella vitellina* (apothecia): KING GEORGE ISLAND, Admiralty Bay: Smok, 60 m, November 1, 1987.

Cercidospora epipolytropa (Mudd) Arnold

On *Lecanora alpigena*: KING GEORGE ISLAND, Admiralty Bay: Ubocz, E, 130 m, November 26, 1987; Krzesanica, SE, 100 m, October 24, 1987; Dutkiewicz Cliff, 150 m, April 3, 1987; Piasecki Pass, 200 m, March 4, 1987; Rymarz Pass, 160 m, March 4, 1987. King George Bay: Lions Rump, January 18, 2009; Krzymiński Point, February 16, 1989.

****Cercidospora pertusariicola*** Alstrup & Olech, sp. nov.

Ascomata per thallium hospitis sparsa, ad 0.35 mm diam., quoque provecta aetate poro manifesto aperto. Paries ascomatis in sectione viridulus, in partibus basalibus pallidior. Asci cylindrici, 60–110(-140) × 13–15 µm magni, dimensionibus secundum magnitudinem ascomatis variis, octospori. Ascosporae ellipsoides, hyalinae, triseptatis, 22–31(–35) × 7–8 µm magnae, secundum magnitudinem ascomatis variae, ad septa constrictae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Jersak Hills, N, 180 m, on *Lepra corallophora* (syn. *Pertusaria c.*), February 7, 1990, M. Olech (KRA-holotype).

Paratypes, all on *L. corallophora* (syn. *Pertusaria c.*): KING GEORGE ISLAND, Admiralty Bay: Sphinx Hill, NE, 50 m, August 8, 1987; Krzesanica, SE, 30 m, January 27, 1990; Kasprowy Hill, 60 m, August 2, 1987; Dutkiewicz Cliff, 110 m, August 29, 1987 (C); Mount Flaggstaff, 190 m, December 19, 1987; Smok, 60 m, November 1, 1987. LIVINGSTON ISLAND, Ballester Point, N, 45 m, January 8, 1988.

Ascoma-wall greenish in section, paler in basal parts. Asci cylindrical 60–110(–140) × 13–15 µm, depending on size of ascoma. Ascospores eight, three-septate, constricted at septa, ellipsoid, hyaline, 22–30(–35) × 7–8 µm.

The species is parasymbiotic, not causing discoloration or other damage.

Other collections, all on *Pertusaria signyae* Øvstedal: KING GEORGE ISLAND, Admiralty Bay: Sphinx Hill, S 80 m, January 22, 1988; Ubocz, 80 m, December 16, 1987; Vauréal Peak, SW, 30 m, January 19, 1988.

Cercidospora ochrolechiae Zhurb. also has greenish wall and three-septate ascospores which, however, measures 17.5–21.5 × 4.5–5 µm.

Cercidospora verrucosaria (Linds.) Arnold

On *Megaspora verrucosa*: LIVINGSTON ISLAND, Johnson's Dock area, near Spanish station, 10 m, January 11, 1988. PENGUIN ISLAND: above Gonzales Point, 30 m, January 29, 2009.

Clypeococcum epimelanostolum (Øvstedal & D. Hawksw.) Grube & Hafellner

On *Buellia*, (Bouvetøya).

Clypeococcum placopsiiphilum Øvstedal & D. Hawksw.

On *Placopsis*, (Bouvetøya).

****Dactylospora antarctica*** Alstrup & Olech, sp. nov.

Ascomata basibus angustus sessilia, circiter 150 µm diam., plana, nigra marginibus persistentibus. Excipulum circiter 15 µm latum, fuscum, e hyphis radiantibus formatum vel pseudoparenchymaticum. Subhymenium hyalinum, hymenium hyalinum, gelatine K tractata Lugol + caerulea, 30–35 µm altum; epihymenium circiter 5 µm altum, omnino fuscum. Paraphyses ad apices paulum incrassatae, calyptras obscuras manifestas non praebentes. Asci 25–30 × 10–11 µm magni, 8 spori. Tholus J–. Ascosporae 1septatae, ad septa non constrictae, apicibus rotundatis, parietibus crassis, fuscis, 6.5–8 × 4 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Ubocz, SE, 110 m, on *Lecidea*, December 16, 1987, M. Olech (KRA-holotype, C-isotype).

Ascomata sessile, constricted at base, flat, black, with persistent margin. Excipulum pseudoparenchymatic of radiating hyphae, dark brown in section. Subhymenium

hyaline. Hymenium hyaline, I+ blue, 30–35 µm high. Epihymenium ca. 5 µm high, diffuse brown. Paraphyses slightly enlarged at apex, with dark cap. Asci 25–30 × 10–11 µm. Ascospores eight, one-septate, not constricted at septum, with rounded ends, thick-walled, dark brown, 6.5–8 × 4 µm.

The species has unusual small ascospores, and the excipulum and paraphyses are unusual for a *Dactylospora* Körb. However, it is left here, pending a revision of the genus. The host keys out as *Lecidea lapicida* (Ach.) Ach. after Hertel [25], but it seems to be different from it. *Dactylospora australis* Triebel & Hertel known from *Lecidea lygomma* Nyl. in New Zealand has distinctly apically enlarged paraphyses and ascospores measuring 9.5–11.5(–13.5) × 4.5–5.5(–6) µm.

Dactylospora australis Triebel & Hertel

On *Poeltidea perusta* (Nyl.) Hertel & Hafellner: LIVINGSTON ISLAND, Johnson's Dock area, Ballester Point, December 27, 1986, near Spanish station, December 27, 1986. Sophia Regina Hill, 30 m, January 11, 1988 (dupl. in C).

Dactylospora dobrowolskii Olech & Alstrup

On *Caloplaca sublobulata*: KING GEORGE ISLAND, King George Bay: Lions Rump, January 11, 2009

Otherwise known only from Bunger Oasis, East Antarctica [13].

****Dactylospora haematommatis*** Alstrup & Olech, sp. nov.

Ascomata sparsa, sessilia, ad 0.3 mm diam., plana, nigra, marginibus persistentibus. Subhymenium hyalinum, hymenium hyalinum, gelatine K tractata Lugol + caerulea, 30–35 µm altum; epihymenium circiter 5 µm altum, omnino fuscum. Paraphyses 1.5 µm crassae, cellulis terminalibus 5–6 µm diam., obscure calyptratis. Asci late ellipsoides 48.5–52 × 17.5–19.5 µm magni, octospori. Tholus J–. Ascosporae late ellipsoids, 1septatae, ad septa non constrictae, apicibus rotundatis, parietibus aequicrassis, fuscae, 13–14 × 8.5–10 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Point Thomas, Squirrel Rock, 7 m, on *Haematomma erythromma*, August 24, 1987, M. Olech (KRA-holotype). Paratype: KING GEORGE ISLAND, Admiralty Bay: Sphinx Hill, 15 m, on *H. erythromma*, August 8, 1987 (C).

Ascomata dispersed, sessile, to 0.3 mm in diameter. Margin persistent, carbonized, disc flat.

Subhymenium hyaline. Hymenium 55–60 µm high, gelatine KI+ blue. Paraphyses ca. 1.5 µm thick, with enlarged, dark-capped apical cells 5–6 µm diam. Asci broadly ellipsoid, 48.5–52 × 17.5–19.5 µm, tholus I–, KI–. Ascospores eight, broadly ellipsoid, one-septate, dark brown, 13–14 × 8.5–10 µm.

The species is pathogenic to its host, causing dark grey, necrotic spots on the thallus.

Dactylospora rostrupii Alstrup

On *Pertusaria*: KING GEORGE ISLAND, Sphinx Hill, 5 m, January 22, 1988.

Some of the ascospores are one-septate, but two- and three-septate are more frequent. Some of the one-septate spores are bigger than reported from the type specimen from the Faroe Islands [26] viz. up to 25 × 11 µm. In spite of this difference, it is supposed to represent the same species as both are found on *Pertusaria* sp. The species is pathogenic.

****Dahawkswia lichenicola*** Alstrup & Olech, gen. et sp. nov.

Ascomata perithecioidalia, nigra. Paraphyses circiter 20 µm longae, circa 1.5 µm latae. Hymenium K/I haud reagens. Asci fungentens unitunicati, cylindrici, octospori. Ascosporae uniseriatae, unicellulares, globosae vel late ellipsoidales, brunneae, parietibus crassis, 6.5–7.5 × 6.0–6.5 µm.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Jersak Hills, 200 m, on *Ochrolechia parella*, December 16, 1987, M. Olech (KRA-holotype).

Ascomata perithecioid, black, sessile, with base immersed in host thallus, ostiolate, ca. 100–125 µm diam. Ascoma-wall pseudoparenchymatic, consisting of 2–3 layers of angular cell 3.5–6.0 µm diam., dark brown, paler downwards. Periphyses lining ostiole, ca. 20 × 1 µm, unbranched. Paraphyses ca. 1.5 µm diam., septate, sparsely branched, free, not enlarged or colored at apex. Asci and paraphyses arising in a bundle from a hyaline, pseudoparenchytic subhymenial tissue unclearly separated from host tissue. Asci cylindrical, 45–55 × 6–7 µm, unitunicate, eight-spored. Ascospores uniseriate, at first appearing square and hyaline, gradually turning dark brown, spherical to broadly ellisoid and rough-walled, 6.5–8.0 × 6.0–7.0 µm., released through the ape× of asci before becoming quite ripe.

Etymology: the genus is named in honor of David. L. Hawksworth and the name resembles his well-known author abbreviation.

****Dendrophoma acarosporae*** Alstrup & Olech, sp. nov.

Conidiomata pycnidia circa 0.2 mm lata. Paries pseudoparenchymatica, cellulis 4–6 µm latis, superne brunneis, basi sensim pallescens. Conidiophoria usque circa 5 × 2 µm, cellulis conidiogenis terminalibus integratis. Conidia uniseriata cum minimis basi faciens ellipsoidalia, hyalina, 2.5–3.0 × 1.5–2.0 µm.

Type: KING GEORGE ISLAND, Windy Glacier forefield, 15 m, on *Acarospora macrocyclos*, January 10, 2006, M. Olech (KRA-holotype).

Conidiomata pycnidia, ca. 0.2 mm diam. Wall pseudoparenchymatic, of cells 4–6 µm diam., dark brown in upper part, lower parts gradually becoming paler. Conidiophores to ca. 50 × 2 µm, conidiogenous cell terminal, integrated. Conidia formed in a row with the youngest at the base, ellipsoid, hyaline, 2.5–3 × 1.5–2 µm.

****Didymellopsis antarctica*** Alstrup & Olech, sp. nov.

Ascomata sparsa vel congregata, semi-immersa, ad 0.15 mm diam., nigra, nitida. Excipulum, Subhymenium hyalinum, hymenium hyalinum, J–. Hamathecium e paraphysoidibus parum ramificatis et parum anastomosantibus formatum. Ascosporae ellipsoides, triseptatae, ad septa media constrictae, interdum ibi fractae, hyalinae, provecta aetate pallide cinereae, 14–16 × 5–6 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Rescuers Hills, SE, 30 m, on *Acarospora macrocyclos*, March 23, 1987, M. Olech (KRA-holotype). Paratypes, all on *A. macrocyclos*: KING GEORGE ISLAND, Admiralty Bay: Patelnia, N, January 19, 1990; Rescuers Hills, 20 m and 50 m, January 22, 1988; Llano Point, 30 m, March 23, 1987; Ornithologists Creek, 5 m, January 23, 1988 (C); Janorzewski Gardens, 26 May 1987; Stenhouse Bluff, 10 m, November 12, 1987. King George Bay: Cape Lions Rump, near penguin rookery, 50 m, January 31, 1990.

Ascomata dispersed or aggregated, semi-immersed, black, nitid, 80–150 µm diam. Hymenium and asci I– and KI–. Hamathecium little branched and with few anastomoses. Asci cylindrical to clavate, fissitunicate, 60–80 × 12–13 µm, eight-spored. Ascospores ellipsoid, three-septate, constricted and sometimes braking at the median septum, hyaline to pale grayish as old, 14–16 × 5–6 µm.

On *A. badiofusca* (Nyl.) Th. Fr.: DECEPTION ISLAND, ridge above Emerald Lake, December 28, 1986.

No *Didymellopsis* was known from *Acarospora* sp.

Endococcus matzeri D. Hawksw. & Iturr.

On *Buellia*, (Queen Mary Land).

Endococcus propinquus (Körb.) D. Hawksw.

On unknown host, probably *Porpidia*: KING GEORGE ISLAND, Admiralty Bay, Baszta, 110 m, December 11, 1987.

Endococcus rugulosus Nyl.

On *Rhizocarpon geminatum*: LIVINGSTON ISLAND, Agata Point, January 10, 1988.

Epibryon conductrix (Norman ex Th. Fr.) Nik. Hoffm. & Hafellner

KING GEORGE ISLAND, Admiralty Bay: Sugar Mound, N, on *Catapyrenium daedaleum* (Kremp.) Stein, 100 m, December 11, 1087.

Geltingia associata (Th. Fr.) Alstrup & D. Hawksw.

On *Ochrolechia frigida*: KING GEORGE ISLAND, King George Bay: Turret Oasis, above Flame Point, 40 m, January 23, 2009.

Illosporium roseum Mart.

On *Peltigera didactyla*: LIVINGSTON ISLAND, Johnson's Dock area: Ballester Point, N, 30 m, December 27, 1987.

Intralichen christiansenii (D. Hawksw.) D. Hawksw. & M. A. Cole

On *Candelariella vitellina*: KING GEORGE ISLAND, Admiralty Bay: Point Thomas, 10 m, November 7, 1987.
On *Rinodina olivaceobrunnea*: KING GEORGE ISLAND, Admiralty Bay: Jersak Hills, 240 m, November 27, 1987.

Intralichen sp.

On *Protoparmelia loricate* Poelt & Vězda: KING GEORGE ISLAND, Admiralty Bay: moraine by northern edge of Ecology Glacier, 50 m, November 3, 1987.

Lasiosphaeriopsis cfr. ***lecanorae*** Pérez-Ort. & Halici

On *Lecanora alpigena*: KING GEORGE ISLAND, Admiralty Bay: Zamek, SE, 200 m, on January 6, 1987; Penguin Ridge, 55 m, June 23, 1987.

The collections deviate from the description provided by Pérez-Ortega & Halici [27] in having only four ascospores instead of eight; furthermore, the ascospores are slightly smaller. Further material is necessary to determine whether it belongs to an undescribed species.

Lasiosphaeriopsis stereocaulicola (Th. Fr. ex Linds.) O. E. Erikss. & R. Sant.

On *Stereocaulon alpinum* Laurer: KING GEORGE ISLAND, Admiralty Bay: above Plaza Point, 50 m, March 4, 1987; Ullman Spur, NW, 50 m, December 19, 1987.

Lichenoconium lecanorae (Jaap) D. Hawksw.

On multiple hosts: Deception Island.

Lichenoconium usneae (Anzi) D. Hawksw.

On *Cladonia chlorophaea*: KING GEORGE ISLAND, Admiralty Bay: Hala, January 23, 1987.
On *C. pyxidate* (L.) Hoffm.: LIVINGSTON ISLAND, Polish Academy of Sciences Point, February 23, 1986.
On *Lecanora*: KING GEORGE ISLAND, Admiralty Bay: moraine by the northern edge of Ecology Glacier, 15 m, January 23, 1988.
On *Parmelia saxatilis* (L.) Ach.: KING GEORGE ISLAND, Admiralty Bay: Mt Wawel, 75 m, February 17, 1990.
On *Rhizoplaca aspidophora*: KING GEORGE ISLAND, Admiralty Bay: Penguin Ridge, October 8, 1987. Upłaz, 60 m, March 14, 1987. Ubocz, 60 m and 90 m, January 21, 1987. King George Bay: Cape Lions Rump, 50 m, January 31, 1987.

The species is strongly pathogenic to the *Rhizoplaca*, forming circular, necrotic spots up to 5–7 mm diam.

****Lichenohostes citrinospora*** Alstrup & Olech, gen. et sp. nov.

Coememycete parasaymbioticum. Conidiomata pycnidiformia, immersa, osteolis liberis, usque 0.3 µm latis. Paries pycnidii hyalina. Lumen KI haud reagens, hyphae hyalinae repleto, circa 1.5 µm crassum. Conidiogeni cellula integrata, terminalis. Conidia citriniformes, simplices, hyalina, 9–12 × 7–8 µm.

Type: South Shetland Islands, LIVINGSTON ISLAND, Juan Carlos I Hill, 160 m, on *Placopsis contortuplicata*, February 22, 1990, M. Olech (KRA-holotype).

Parasymbiotic coelomycete. Conidiomata pycnidioform, immersed, with free ostiole, to 0.3 mm in diameter. Pycnidie-wall hyaline, not clearly delimited from host tissue. Lumen KI–, filled by hyaline hyphae ca. 1.5 µm thick. Conidiogenous cell integrated, terminal. Conidiogenesis terminal, exact way obscure. Conidia citriniform, simple, hyaline, 9–12 × 7–8 µm.

The citrus-shaped conidia with small appendages at the ends suggest that conidia are formed in a row.

Lichenopeltella leptogii Diederich

On *Leptogium puberulum*: KING GEORGE ISLAND, Admiralty Bay: Cytadela, 100 m, March 13, 1987 (C); Ullman Spur, SE, 30 m, December 19, 1987. LIVINGSTON ISLAND, Johnson's Dock area, near Spanish station, January 11, 1988.

Lichenostigma alpinum (R. Sant. Alstrup & D. Hawksw.) Ertz & Diederich (syn. *Phaeosporobolus alpinus* R. Sant. Alstrup & D. Hawksw.)

On *Ochrolechia frigida*: KING GEORGE ISLAND, Admiralty Bay: Blue Dyke, NE, 110 m, December 11, 1987; Demay, SE, 110 m, December 13, 1987; Sphinx Hill, NW, 100 and 155 m, December 8, 1987; Point Thomas, 60 m, September 18, 1987; Jersak Hills, 190, November 27, 1987; Kasprowy Hill, 270 m, February 4, 1990; Urbanek Crag, SW, 130 m, October 20, 1987; Ullman Spur, NW, 50 m, December 14, 1987, March 5, 1987; Mt Wawel, NW, 100 m, February 6, 1987; King George Bay: above Flame Point, 20 m, January 23, 2009. PENGUIN ISLAND, above Gonzales Point, 25 m, January 1, 2007; moraine of Polonia Glacier, 40 m, January 21, 2009.
On *O. parella*: KING GEORGE ISLAND, Admiralty Bay: Jersak Hills, 200 m, December 16, 1987.

On *Lecania brialmontii*: KING GEORGE ISLAND, Admirality Bay: Urbanek Crag, SW, 130 m, October 20, 1987; Ullman Spur, NW, 50 m, December 14, 1987; Mt Wawel, NW, 100 m, February 6, 1987; Sphinx Hill, NW, 100, December 8, 1987; Jersak Hills, 190, November 27, 1987; Kasprowy Hill, 270 m, February 4, 1990; Point Thomas, 60 m, September 18, 1987; Demay Point, SE, 110 m, December 13, 1987; Blue Dyke, NE, 110 m, December 11, 1987. King Georg Bay: Above Flame Point, 20 m, January 23, 2009; moraine of Polonia Glacier, 40 m, January 21, 2009. PINGUIN ISLAND, hill above Gonzales Point, 25 m, January 1, 2007. LIVINGSTON ISLAND, Agata Point, 100 m, January 10, 1988; Sophia Regina Hill, NW, 30 m, January 11, 1988.
On *Lepra corallophora* (syn. *Pertusaria c.*): KING GEORGE ISLAND, Admiralty Bay: Kasprowy Hill, 60 m, August 2, 1987. King George Bay: Sukiennice Hills, 100 m, January 8, 2007. LIVINGSTON ISLAND, Agata Point, 100 m, January 10, 1988; Polish Academy of Sciences Point, 10 m, January 11, 1988.
On *Pertusaria pseudoculata* Øvstedal: KING GEORGE ISLAND, Admiralty Bay: Urbanek Crag, SW, 120 m, October 20, 1987.
On *Lecidella*: KING GEORGE ISLAND, Admiralty Bay: Dutkiewicz Cliff, 70 m, February 4, 1990.

****Lichenostigma corymbosae*** Alstrup & Olech, sp. nov.

Species haec mycelio superficiali, brunneo, rete hypharum singularium formantibus, circiter 5 µm crassis, ascomatis irregularibus, usque 150 µm latis, nigris, ostiolis nullis, ascosporis reniformibus apice rotundatis, brunneis, uniseptatis, 25–28 × 11–13 µm facillime distinguitur.

Type: South Shetland Islands, KING GEORGE ISLAND, King George Bay: Turret Oasis, Tatur Hill, 40 m, on *Catillaria corymbose* (Hue) I. M. Lamb, January 21, 2009, M. Olech (KRA-holotype).

Mycelium superficial, dark brown, forming a network of single hyphae ca. 5 µm thick. Ascomata irregular, to 150 µm diam., black, without ostiole. Asci not observed. Ascospores kidney-shaped, ends rounded, dark brown, uniseptate, 25–28 × 11–13 µm.

****Llanorella ramalinae*** Alstrup & Olech, gen. et sp. nov.

Mycelium superficiale, prostratum, uniseriatum, cellulis 7–8 µm latis, 3.5–4.5 µm longis, raro ramosum anastomosansque. Conidia thalloconidia ut rami laterali substrato discreti, constantia ex usque 20 cellulis rotundatis, 5–8 µm latis, in minoribus segmentis fractis.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Llano Point, E, 6 m, on *Ramalina terebrata*, December 22, 1987, M. Olech (KRA). Paratypes: PENGUIN ISLAND, Gonzales Point, 20 m, January 26, 2009, M. Olech (C). Crater Lake, 25 m, January 26, 2009, M. Olech (KRA).

Mycelium superficial, prostrate, of single rows of cells. Cells 7–8 µm broad, 3.5–4.5 µm long, rarely branched and rarely anastomosed. Conidia thalloconidia, as sidebranches free of substrate, consisting of up to 20 rounded cells 5–8 µm diam. which break up into smaller units.

Etymology: the new genus is named after Dr. G. A. Llano, who has visited the type locality, which is also named after him.

Merismatium nigritellum (Nyl.) Vouaux

On *Cladonia* cfr. *borealis* (squamules): KING GEORGE ISLAND, Admiralty Bay: Cytadela, W, 100 m, March 13, 1987.

****Metasphaeria verrucosae*** Alstrup & Olech, sp. nov.

Ascomata subimmersa, nigra, nitida. Hamathecium ramosum, hyphis circa 2–3 µm latis. Asci anguste ellipsoidei, circa 150–160 × 30–35 µm, octospori. Ascosporae hyalinae, guttulatae, triseptatae, leniter constricta in septa, apice rotundata, 45–52 × 15–18 µm.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Demay Point, 10 m, on Megaspora verrucosa, 1. January 1987. M. Olech (KRA-holotype).

Ascomata semi-immersed, black, nitid, Hamathecium branched, af hyphae ca. 2–3 µm thick. Asci narrowly ellipsoid, ca. 150–160 × 30–35 µm, eight-spored. Ascospores hyaline, guttulate, three-septate, slightly constricted at septa, ends rounded, 45–52 × 15–18 µm.

No *Metasphaeria* Sacc. was known from *Megaspora* (Clauzade & Cl. Roux) Hafellner & V. Wirth.

****Micarea lichenicola*** Alstrup & Olech, sp. nov.

Ascomata saepe congregata, sessilia, ad 0.3 mm diam., valde convexa. Excipulum nullum. Subhymenium fuscum, hymenium hyalinum vel in parte superiore viridulum, circiter 40 µm altum. Epihymenium circiter 5–7 µm altum, viridulum. Paraphyses circiter 1 µm crassae, ramificatae, anastomasantes. Asci clavati, 30–35 × 12–15 µm magni, octospori. Ascosporae ellipsoides, septis nullis, hyalinae, 11–14 × 3.5–4.5 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Demay Point, 70 m, February 3, 1990, on *Lepra corallophora* (syn. *Pertusaria c.*), M. Olech (KRA-holotype).

Ascomata dispersed or aggregated, strongly convex, up to 0.3 mm diam., black. Margin absent. Subhymenium dark brown. Hymenium ca. 40 µm high, hyaline to greenish in the upper part. Epihymenium 5–7 µm high, greenish. Paraphyses branched and anastomosed, ca. 1 µm thick. Asci clavate, 30–35 × 12–15 µm. Ascospores eight, nonseptate, ellipsoid, hyaline, 11–14 × 3.5–4.5 µm.

Only one other unlichenized, lichenicolous *Micarea* Fr. is known, *M. inquinans* (Tul.) Coppins, which occurs on *Dibaeis baeomyces* (L. f.) Rambold & Hertel in Europe. It has dark brown epihymenium and smaller ascospores. *Micarea lichenicola* is pathogenic, as the infected parts are strongly damaged.

Muellerella lichenicola (Sommerf.) D. Hawksw.

On multiple hosts, especially Teloschistaceae and Physciaceae: (Victoria Land).

Muellerella pygmaea (Körb.) D. Hawksw.

On *Candelariella aurella* (Hoffm.) Zahlbr.: KING GEORGE ISLAND, Admiralty Bay: Uchatka Point, 10 m, February 3, 1987; Upłaz, 30 m, January 21, 1987.
On *Carbonea assentiens*: KING GEORGE ISLAND, Admiralty Bay: Upłaz, 60 m, December 15, 1987, King George Bay: Cape Lions Rump, January 18, 1988.
On *Lecanora alpigena*: KING GEORGE ISLAND, Admiralty Bay: Brama, 80 m, December 18, 1987; Krokiew, 160 m, May 5, 1987.

Niesslia cladoniicola D. Hawksw. & W. Gams

On *Cladonia pyxidata* (basal squamules): LIVINGSTON ISLAND, Johnson's Dock area, Ballester Point, NW, 20 m, December 27, 1986. Polish Academy of Sciences Point, February 23, 1990.

Nigropuncta rugulosa D. Hawksw.

On *Bellemerea subsorediza*: KING GEORGE ISLAND, Admiralty Bay: moraine of Sphinx Glacier, 15 m, January 18, 2009.

Obryzum corniculatum (Hoffm.) Wallr.

On *Leptogium puberulum*: KING GEORGE ISLAND, Admiralty Bay: Ullman Spur, 10 m, 130 m, December 19, 1987; Hennequin Point, at the beach, February 6, 1987. Mount Flagstaff, 150 m, March 4, 1987.

Phacopsis usneae C. W. Dodge

On *Usnea antarctica* Du Rietz: KING GEORGE ISLAND, Admiralty Bay: Trzy Stawy, 40 m, January 9, 2007; Rescuers Hills, 80 m and 100 m, December 8, 1987; Penguin Ridge, NE, 40 m, January 15, 1996; rock near Jasnorzewski Garden, 10 m, May 31, 1987; Upłaz, 50 m, May 5, 1987; Skua Cliff, E, 100 m, December 1, 1987; Krokiew, 130 m, October 20 1987; Jersak Hills, February 9, 1990. King George Bay: Lions Rump, 40 m, January 18, 2009; Muddy Stream Valley, SW, 27 m, January 9, 2009; Sukiennice Hills, 40 m, January 13, 2009; Flame Point, 20 m, January 10, 2007; Turret Point, W, 10 m, January 23, 2009; Tatur Hill, 40 m, January 23, 2009; moraine of White Eagle Glacier, 100 m, January 13, 2009. PENGUIN ISLAND, Gonzales Point, 15 m, January 27, 2009; 25 m, January 1, 2007 (dupl. in C); 30 m, January 29, 2009; inside of central crater, 90 m, January 27, 2009; Deakon Peak, E, 20 m, January 26, 2009; above Marr Point, S, 10 m, January 10, 2007. LIVINGSTON ISLAND, Sophia Regina Hill, 60 m, February 23, 1990; Johnson's Dock area, near Spanish station, January 9, 1988. DECEPTION ISLAND, Ronald Hill, December 28, 1986; Cathedral Crags, December 28, 1986.
On *U. aurantiacoatra* (Jacq.) Bory: LIVINGSTON ISLAND, Johnson's Dock area near Spanish station, January 9, 1988. KING GEORGE ISLAND, Admiralty Bay: Tower nunatak, 280 m, December 12, 1987; Demay, 100 m, December 10, 1987; Mt Wawel, E, 170 m, February 6, 1987. King George Bay: Chopin Ridge, 135 m, January 23, 2009; Tatur Hill, 40 m, January 23, 2009.

The species is only known from Antarctica and southern Chile.

****Phaeospora antarctica*** Alstrup & Olech, sp. nov.

Ascomata sparsa, semi-immersa, ad 0.2 mm diam., nigra, nitida. Hamathecium non visum. Gelatina hymenialis K tractata Lugol + caerulea, cytoplasma ascorum eodem modo tractatum flavidum. Asci cylindrici, 58–72 × 13–25 µm magni, apice manifesto rostrati, octospori. Ascosporae 1–3-septatae, ad septa plus minusve constrictae, maturae pallide cinereo-fuscidae, 12.5–15.5 × 5.5–6 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Uchatka Point, 10 m, on *Rinodina olivaceobrunnea*, February 4, 1987, M. Olech (KRA-holotype).

Ascomata dispersed, sessile, ca. 0.2 mm in diameter, black, nitid. Ascoma-wall black, pseudoparenchymatic of angular cells ca. 5–7 µm diam., paler inwards. Hamathecium not seen. Asci cylindrical, 58–72 × 13–15 µm, with distinct apical beak. Hymenial gelatine KI+ blue, ascal cytoplasma KI+ yellow. Ascospores eight, one–three-septate, ± constricted at septae, pale grey-brown as mature, 12.5–15.5 × 5.5–6 µm.

Both *P. arctica* on diverse hosts in the Arctic, *P. convolutae* described below, and *P. subantarctica* Øvstedal & D. Hawksw. on *Lecania* in Bouvetøya have asci turning orange-red with iodine.

****Phaeospora convolutae*** Alstrup & Olech, sp. nov.

Ascomata sessilia, nigra, opaca vel subnitida, usque circa 170 µm lata. Gelatina hymenii J et KJ haud reagens. Asci primum ovati, basi latissimi, circiter 30 × 15 µm deinde subcylindrici, circa 45 × 9 µm. Cytoplasma asci J et KJ aurantiaci reagens. Tholus J et KJ

haud reagens. Ascosporae 8, biseriatae in maturis ascis, triseptatae, leniter constrictae in medio septae pallide grisei vel brunneoli, 11.0–13.5 × 3–3.5 µm.

Type: South Shetland Islands, KING GEORGE ISLAND, King George Bay: Turret Oasis, Mersey Point, on *Acarospora convoluta* Darb.: January 20, 2009, M. Olech (KRA-holotype. Paratypes, on *A. convoluta*: same locality, 10 m, January 23, 2009 (duplicate in C); Turret Point, 5 m, January 25, 2009; PENGUIN ISLAND, Gonzales Point, 15 m, January 27, 2009.

Ascomata dispersed to densely aggregated, sessile, black, mat to subnitid, to ca. 170 m diam. Hamathecium absent. Hymenial gelatine I– and KI–. Asci at first ovate, broadest at base, ca. 30 × 15 µm becoming subcylindrical, ca. 45 × 9 µm. Ascal cytoplasma I+ and KI+ orange. Tholus I–, KI–. Ascospores eight, biseriate in mature asci, three-septate, slightly constricted at median septum, pale grey to medium brown, 11–13.5 × 3–3.5 µm.

Other collections (paratypes): on *Acarospora badiofusca*: PENGUIN ISLAND, Gonzales Point, January 27, 2009. KING GEORGE ISLAND, Potter Peninsula, Three Brothers Hill, 60 m, December 18, 2005.

The collections on *A. badiofusca* deviates in ascospores 11–12 × 4.5 µm.

Phaeospora triplicantis (Vain.) Arnold is known from *A. badiofusca* in Finland. It has three–five-septate ascospores measuring 14–17 × 6–7 µm.

Phaeospora subantarctica Øvstedal & D. Hawksw.

On *Lecania brialmontii*: KING GEORGE ISLAND, King George Bay: Turret Oasis, W, 10 m, January 23, 2009; Three Sisters Point, 10 m, January 21, 2009 (dupl. in C); Mersey Point, 10 m, January 25, 2009; Turret Point, 10 m, January 9, 2007. KING GEORGE ISLAND, Admiralty Bay: Blue Dyke, 120 m, December 19, 1987; Rakusa Point, December 21, 1992; Penguin Ridge March 20, 1987. PENGUIN ISLAND, E, January 27, 2009; E, 40 m, January 1, 2007; NW, 20 m January 29, 2009; rock on E border of caldera, 120 m, December 31, 2006; above Gonzales Point, 20 m, January 1, 2007.
On *Lecania gerlachei*: KING GEORGE ISLAND, Admiralty Bay: Blue Dyke, NE, 110 m, December 11, 1987; Uchatka Point, 5 m, January 18, 1990; Vauréal Peak, SE, 75 m, January 19, 1988; King George Bay: Turret Point, 10 m, January 21, 2009.

The species was only known from Bouvetøya [14].

****Phaeosporodendron badiae*** Alstrup & Olech, gen. et spec. nov.

Mycelium superficiale super hospite conidiophora recta pseudoparenchymatica, brunnea formans e 2–3-seriatis cellulis constantibus, usque 70 µm longis, e pseudoparenchymatica basi exorientia. Singulae cellulae conidiophororum globosae vel angulares, 6–10 × 4–8 µm, parietibus crassis verrucosisque, brunneae, thalloconidia apice formans. Thalloconidia 3–10-cellularia, cellulis 4.0–6.5 µm latis.

Type: South Shetland Islands, KING GEORGE ISLAND, moraine by northern edge of Ecology Glacier, 50 m, on apothecia of *Protoparmelia badia*, November 3, 1987, M. Olech (KRA).

Lichenicolous hyphomycete. Mycelium superficial on host, forming upright pseudoparenchymatous, dark brown conidiophores consisting of two–three rows of cells, up to ca. 70 µm high from a pseudoparenchymatous base. Individual cells of conidiophores spherical to angular, 6–10 × 4–8 µm, thick-walled, rough-walled, dark brown, apically forming thalloconidia. Thalloconidia 3–10-celled, of cells 4.5–6.5 µm diam.

****Phoma acarosporae*** Alstrup & Olech, sp. nov.

Pycnidia immersa vel subsessilia, partibus liberis nigris, nitidis, immerses fuscis, 70–120 µm diam. Paries 6–9 µm crassus, pseudoparenchymaticus, e duo stratis cellulorum

formatus. Cellulae conidiogenae ampulliformes, parietem intra tegentes. Conidia recta, circiter 6 × 0.8 µm magna.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Llano Point, on *Acarospora macrocyclos*, March 22, 1987, M. Olech (KRA-holotype).

Pycnidia immersed to almost sessile, 70–120 µm diam., exposed parts black, nitid, immersed parts pale brown. Wall 6–9 µm thick, pseudoparenchymatic, of two cell layers. Conidiogenous cells ampulliform, lining the cavity. Conidia straight ca. 6–0.8 µm.

The species is distinguished amongst the lichenicolous *Phoma* species by the very narrow conidia. It is pathogenic to the host, which turns black and eventually falls off the rock.

No species of *Phoma* was known from *Acarospora*.

Polycoccum follmannii (C. W. Dodge) Alstrup

The species is known from Greenwich Island only. It was as first described as a lichen but lectotypified on a lichenicolous fungus found on it [19]. The host is *Lecidea*.

Polycoccum rugulosarium (Linds.) D. Hawksw.

Syn.: *Endococcus wandelense* Har., *Rhabdospora antarctica* Speg. and probably *Didymosphaeria kuttlingeria* C. W. Dodge and *D. macquariensis* C. W. Dodge.

On *Austroplaca cirrochrooides* (syn. *Caloplaca c.*): KING GEORGE ISLAND, Admiralty Bay: moraine of Windy Glacier, 15 m, January 10, 2006; Patelnia, 15 m, January 16, 2006; Blue Dyke, 10 m, July 3, 1987; Uchatka Point, December 23, 2005; Penguin Ridge, 5 m, January 23, 1988; Shag Point, S, 5 m, August 31, 1987. King George Bay: Cape Lions Rump, 15 m, January 12, 2009; Turret Point, 5 m, January 24, 2009 (dupl. in C). PENGUIN ISLAND, rocks of caldera, S, 110 m, December 31, 2006; above crater Lake, SE, 60 m, January 27, 2009. LIVINGSTON ISLAND, Johnson's Dock area, 10 m, January 8, 1988 (dupl. in C); Pepita Beach, January 9, 1988 (dupl. in C). Polish Academy of Sciences Point, January 10, 1988.
On *Austroplaca hookeri* (C. W. Dodge) Søchting, Frödén & Arup [syn. *Caloplaca h.* (C. W. Dodge) Søchting, Øvstedal & Sancho]: KING GEORGE ISLAND, King George Bay: Olech Hill, 15 m, January 21, 2009; Cape Lions Rump, 15 m, January 12, 2009; Sukiennice Hill, 30 m, January 9, 2009. Admiralty Bay: Blue Dyke, 100 m, February 3, 1987; Uchatka Point, February 3, 1987.
On *Caloplaca insigni* Søchting & Øvstedal s: PENGUIN ISLAND, SW, 60 m, January 27, 2009; rocks of caldera, SE, 110 m, December 31, 2006.
On *C. johnstonii* (C. W. Dodge) Søchting & Olech: KING GEORGE ISLAND, Admiralty Bay: moraine of Windy Glacier, 25 m, January 15, 2006; Kasprowy Hill, 200 m, March 25, 1987. DECEPTION ISLAND, Ridge above Emerald Lake, December 28, 1986.
On *C. millegrana* (Müll. Arg.) Zahlbr.: KING GEORGE ISLAND, Dufayel Island: Plaza Point, March 6, 1987 (dupl. in C). Rakusa Point, 10 m, November 16, 1987.
On *Gondwania regalis* (Vain.) Søchting, Frödén & Arup [syn. *Caloplaca r.* (Vain.) Zahlbr.]: KING GEORGE ISLAND, Admiralty Bay: Rakusa Point, 10 m, February 12, 2005; Demay Point, December 10, 1987; Rescuers Hills, N, 40 m, December 2, 1987; Chabrier Rock, January 14 and 19, 1988 (dupl. in C). King George Bay: Three Sisters Point, 10 m, January 21, 2009.
On *C. sublobulata*: KING GEORGE ISLAND, Admiralty Bay: moraine of Windy Glacier, 20 m, January 10, 2009; Patelnia, 20 m, February 10, 2009; Hala, 10 m, 1 May 1987; Krzesanica, April 18, 1987; Point Thomas, 8 m, September 16, 1987; Panorama Ridge, 8 m, September 16, 1987; Szafer Ridge, November 19, 1987; Upłaz, NW, 40 m, January 14, 1990. Potter Penisula: Three Brothers Hill, 60 m, December 12, 2005. King George Bay: Turret Point, 20 m, January 9, 2007; Conglomerate Bluff, 140 m, January 8, 2007; Magda Nunatak, 250 m (leg. A. Tatur), January 11, 2007; Cape Lions Rump, 20 m, January 8, 2009; Green Hills, 15 m, January 11, 2009; Randy Point, 10 m, January 18, 1988; Sukiennice Hills, 10 m, January 13, 2009. Legru Bay: Low Head,

January 7, 2007. PENGUIN ISLAND, above petrel colony, 20 m, January 1, 2007; SW near penguin rookery, 50 m, January 26, 2009; above Gonzales Point, 20 m, January 1, 2007; above Crater Lake E, 40 m, January 1, 2007; above Marr Point 50 m, January 1, 2007. LIVINGSTON ISLAND, Pepita Beach, 3 m, January 9, 1988. Ballester Point, 5 m, January 8, 1988 (dupl. in C); Polish Academy of Sciences Point, 10 m, January 11, 1988. moraine near Spanish station, January 11, 1988. DECEPTION ISLAND, Stonethrow Ridge, December 28, 1986.
On *Caloplaca*: KING GEORGE ISLAND, Potter Penisula: Three Brothers Hill, 60 m, December 18, 2005.
On *Xanthoria elegans* (Link) Th. Fr.: KING GEORGE ISLAND, Admiralty Bay: Agat Point, March 22, 1987; Upłaz, February 20, 1987.

The species was only known from Tasmania and subantarctic islands.

****Prostratomyces*** Alstrup & Olech, gen. nov.

Hyphomycetes lichenicola. Mycelium superficiale super hospite ramificatum anastomosansque, e cellulis uniseriatis parietibus crassis constantibus. Conidiophora brevia, prostrata ramificata, apice exorientia, enteroblasta, distincte collaretalia. Conidia faciens in catenae in segmenta 1–3(–4)-cellularia fractis, parietibus crassis asperisque.

Lichenicolous hyphomycetes. Mycelium superficial on host, of single rows of thick-walled cells, branched and anastomosed. Conidiophores short prostrate sidebranches, conidiogenesis apical, enteroblastic, with distinct collarettes. Conidia formed in a chain breaking up in units of 1–3(–4) cells, thick-walled and rough-walled.

Type species *P. leprariae* described below.

The conidiogenesis of *Prostratomyces* resembles that of *Taeniolella* S. Hughes, but it differs from that genus in having a superficial dark brown mycelium and prostrate conidiophores, while *Taeniolella* has immersed hyaline or pale mycelium and upright conidiophores.

****Prostratomyces leprariae*** Alstrup & Olech, sp. nov.

Species haec mycelio cellulis brunneis, circa 4.5–5.5 µm latis et 6.0–7.5 µm longis, cellulis conidiogenis circiter 6 µm latis, catenis conidialibus in segmenta 2–3-cellularia fractis, verruculosis.

Type: South Shetland Islands, KING GEORGE ISLAND, Admirality Bay: rocks above Ecology Glacier, 80 m, on *Lepraria*, December 30, 1989, M. Olech (KRA-holotype).

Mycelium of dark brown cells ca. 4.5–5.5 µm broad and 6–7.5 µm long, conidiogenous cells ca. 6 µm diam., conidial chain breaking up in two–three-celled units, cells thick-walled and verruculose.

****Prostratomyces ochrolechiae*** Alstrup et Olech, sp. nov.

Species distinctissima mycelio cellulis plus minusve rotundis, 3.5–5.5 um latis et conidiis plerumque bicellularibus, 11.0–11.5 × 6.0–6.5 µm latis, parietibus incrassatis verruculosisque distinguitur.

Type: South Shetland Islands, KING GEORGE ISLAND, King George Bay: Lions Rump, 131 m, on *Ochrolechia parella*, January 13, 2009, M. Olech (KRA-holotype).

Mycelium of ± rounded cells 3.5–5.5 µm diam. Conidia mostly two-celled, 11–11.5 × 6–6.5 µm, thick-walled, verruculose.

****Prostratomyces rhizocarpicolae*** Alstrup & Olech, sp. nov.

Species haec mycelio cellulis brunneis, verruculosis, parietibus crassis, circiter 7–8 µm latis et conidiis 2–3-cellularibus, circa 6 µm latis, distincte verruculosisque iam dignoscenda.

Type: South Shetland Islands, KING GEORGE ISLAND, Jersak Hills, on *Rhizocarpon geographicum*, January 19, 2006, M. Olech (KRA-holotype).

Mycelim of dark brown, thick-walled and verruculose cells ca. 7–8 µm in diameter, Conidia two–three-celled, ca. 6 µm in diameter, distinctly verruculose.

Protothelenella santessonii H. Mayrhofer

On *Cladonia pyxidata* (decaying): KING GEORGE ISLAND, Admiralty Bay: Upłaz, 30 m, April 15, 1987.

Pseudopyrenidium tartariicola (Linds.) Nav.-Ros., Zhurb. & Cl. Roux

On *Ochrolechia frigida*, KING GEORGE ISLAND, Admiralty Bay: Smok, November 1, 1987. LIVINGSTON ISLAND, Johnson's Dock area: Ballester Point, 20 m, December 27, 1987.

In the present collections, the ascospores are three–seven-septate, eventually also with oblique septa, but on a whole more regularly transseptate than in the type specimen from Greenland.

****Rhagadostoma antarctica*** Alstrup & Olech, sp. nov.

Ascomata immersa, solum area ostiolari libera vel semi-immersa, parietibus asperis, cavis internis 0.15–0.25 mm diam., K tractati omnino J–. Excipulum crassitudine inter 30 et 70 µm varium, extra pseudoparenchymaticum, cellulis circiter 10 µm diam., intra ee cellulis elongates, circiter 15 × 5–7 µm magnis formatum, omnibus cellulis in sectione fuscis. Hamathecium in ascomatibus matures non visum, in juvenibus circiter 2 µm crassum, vacuoles impletum. Asci anguste clavati, circiter 70 × 10 µm magni, 4 spori. Ascosporae hyalinae, 1septatae, quaque cellula vacuola nonnulla foventes, subcurvae, 37–50 × 6–7.5 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: near Arctowski Station, 15 m, on *Psoroma hypnorum* (Vahl) Gray, April 15, 1987, M. Olech (KRA-holotype)

Ascomata immersed with only the ostiolar area free or semi-immersed, rough walled, lumen 0.15–0.25 mm in diameter, all KI–. Exciple of varying thickness, 30–70 µm, the outer wall pseudoparenchymatic, of cells ca. 10 µm diam., the inner layer of elongate cells ca. 15 × 5–7 µm, all dark brown in section. Hamathecium not seen in ripe ascomata, in young ascomata ca. 2 µm thick and full of vacuoles. Asci narrowly clavate, ca. 70 × 10 µm. Ascospores four, hyaline, one-septate, with a few vacuoles in each cell, slightly bent, 37–50 × 6–7.5 µm.

The species is strongly pathogenic, the host is transformed into small convex areoles each hosting a single parasitic ascoma. The host does not form apothecia but becomes grey and finally dies.

Sagediopsis campsteriana (Linds.) D. Hawksw. & R. Sant.

On *Pertusaria*: KING GEORGE ISLAND, Admiralty Bay: Demay Point, February 2, 1987; Sphinx Hill, 5 m, January 22, 1988; Krzesanica, April 18, 1987; Dutkiewicz Cliff, 100 m, August 5, 1987; Vauréal Peak, 220 m, January 19, 1988.

Scutula epiblastemica (Wallr.) Rehm

On *Peltigera didactyla*: LIVINGSTON ISLAND, Johnson's Dock area, Ballester Point, W, 80 m, December 27, 1986.

Skyttea elachistophora (Nyl.) Scherwood & D. Hawksw. (syn. *S. tephromelarum* Kalb & Hafellner)

On *Tephromela atra*: KING GEORGE ISLAND, Admiralty Bay: Sphinx Hill, 80 m, December 8, 1987. King George Bay: Sukiennice, 40 m, January 13, 2009.

Sphaerellothecium araneosum (Rehm ex Arnold) Zopf

On *Ochrolechia frigida*: KING GEORGE ISLAND, Potter Peninsula: Three Brothers, 60 m, January 30, 2007. Admiralty Bay: Demay, SE, 110 m, December 13, 1987; moraine at northern edge of Ecology Glacier, 40 m, December 16, 1995; Urbanek Crag, W, 130 m, October 20, 1987; Ullman Spur, 160 m, March 5, 1987; Jersak Hills, 150 m, January 18, 2006. King George Bay: moraine of White Eagle Glacier, 90 m, January 14, 1990. PENGUIN ISLAND, above Gonzales Point, 25 m, January 1, 2009. LIVINGSTON ISLAND, Agata Point, 100 m, January 10, 1988.
On *Pertusaria pseudoculata*: KING GEORGE ISLAND, Admiralty Bay: Demay Point, SE, 110 m, December 13, 1987; Urbanek Crag, W, 130 m, October 20, 1987.

Sphaerellothecium buelliae (C. W. Dodge) D. Hawksw. & Iturr.

On *Buellia muscicola* C. W. Dodge & G. E. Baker: (Queen Mary Land, Possession Nunatak).

Sphaerellothecium cladoniae (Zhurb. & Alstrup) Hafellner

On *Cladonia asahinae* W. Thomson: KING GEORGE ISLAND, Admiralty Bay: Rescuers Hills, NE, 100 m, January 16, 2005.
On *C. borealis*: KING GEORGE ISLAND, Admiralty Bay: Sphinx Hill, 140 m, February 16, 1990; Jersak Hills, 140 m, February 8, 1990. King George Bay: moraine of Zbyszek Glacier, 50 m, January 11, 2007. PENGUIN ISLAND, above Gonzales Point, 30 m, January 29, 2009. LIVINGSTON ISLAND, Polish Academy of Sciences Point, 25 m, January 10, 1988; Ballester Point, W, 80 m, December 27, 1986.
On *C. cariosa*: KING GEORGE ISLAND, Admiralty Bay: moraine at northern edge of Ecology Glacier, 60 m, January 25, 1996; Stenhouse Bluff, S, 50 m, November 22, 1987.
On *C. chlorophaea*: KING GEORGE ISLAND, Admiralty Bay: Demay, S, 160 m, February 2, 1987; Mt Wawel, SW, 80 m, February 18, 1980.
On *C. galindezii* Øvstedal: KING GEORGE ISLAND, Admiralty Bay: Tadek Hill, 150 m, December 30, 1987.
On *C. gracilis* (L.) Willd.: KING GEORGE ISLAND, Fildes Peninsula: Fossil Hill, 10 m, January 12, 1988.
On *C. pocillum* (Ach.) O. J. Rich.: KING GEORGE ISLAND, Admiralty Bay: Sphinx Hill, 110 m, February 5, 1980; Ubocz, NE, 70 m, December 15, 1987. PENGUIN ISLAND, above Crater Lake, E, 40 m, January 1, 2007. LIVINGSTON ISLAND, Johnson's Dock area, Ballester Point, N, 10 m, January 9, 1988. Polish Academy of Sciences Point, 30 m, January 10, 1988.
On *C. pyxidata*: KING GEORGE ISLAND, Admiralty Bay: Uchatka Point, 10 m, February 4, 1987; Demay, 180 m, February 2, 1987; Rescuers Hill, 50 m, January 6, 1990. LIVINGSTON ISLAND, Polish Academy of Sciences Point, February 23, 1986.
On *C. sarmentosa* (Hook. f. & Taylor) C. W. Dodge 1948: KING GEORGE ISLAND, Admiralty Bay: moraine at northern edge of Ecology Glacier, 20 m, January 21, 1996. King George Bay: moraine of Polonia Glacier, 40 m, January 21, 2009. Potter Penisula: Three Brothers Hill, 60 m, December 18, 2005. PENGUIN ISLAND, above Gonzales Point, 30 m, January 1, 2007.
On *Cladonia*: KING GEORGE ISLAND, Admiralty Bay: Red Hill, 20 m and 100 m, January 26, 2002.; Plaza Point, 50 m, March 4, 1987. King George Bay: Turret Oasis, 50 m, January 11, 2007; Tatur Hill, 40 m, January 21, 2009. PENGUIN ISLAND, above

Gonzales Point, 25 m, January 1, 2009. LIVINGSTON ISLAND, Agat Point, 20 m, December 30, 1987; Sophia Regina Hill, 60 m, February 23, 1990.

Sphaerellothecium minutum Hafellner

On *Sphaerophorus globosus*: KING GEORGE ISLAND, Admiralty Bay: Demay Point, 100 m, December 10, 1987; Mount Flagstaff, W, 30 m, December 19, 1987; Mount Wawel, NW, 50 m, February 6, 1987. King George Bay: Turret Oasis, Depot Crag, 50 m, January 11, 2007; Tatur Hill, 45 m, January 21, 2009.

****Sphaerellothecium placopsiicola*** Alstrup & Olech, sp. nov.

Mycelium forming a reticulate, black network, of angular, dark brown cell, ca. 5–6 × 3 µm. Ascomata perithecioid, dispersed, sessile, black, ostiolate, 50–70 µm diam. Asci 35–40 × 10–15 µm, J+ orange, with distinct tholus. Ascospores eight, ellipsoid with rounded ends, three-septate, sometimes a little constricted at the median septum, a little narrower in the lower part, 9.5–10.5 × 4–5 µm.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Bastion nunatak, SE, 250 m, on *Placopsis contortuplicata*. December 12, 1987, M. Olech (KRA-holotype, C-isotype). Paratype, on *P. contortuplicata*: KING GEORGE ISLAND, Admiralty Bay: Ubocz, 70 m, November 16, 1992.

Mycelium forming a reticulate, black network, of angular, dark brown cell, ca. 5–6 × 3 µm. Ascomata perithecioid, dispersed, sessile, black, ostiolate, 50–70 µm diam. Asci 35–40 × 10–15 µm, I+ orange, with distinct tholus. Ascospores eight, ellipsoid with rounded ends, three-septate, sometimes a little constricted at the median septum, a little narrower in the lower part, 9.5–10.5 × 4–5 µm.

No *Spherellothecium* species was known from *Placopsis*.

Sphaerellothecium stereocaulorum Zhurb. & Triebel

On *Stereocaulon alpinum*: PENGUIN ISLAND, above Gonzales Point, 30 m, January 27, 2009.
On *S. glabrum* (Müll. Arg.) Vain.: KING GEORGE ISLAND, Admiralty Bay: Red Hill, NW, 150 m, January 25, 1980, leg. R. Ochyra; Sphinx Hill, NW, 120 m, February 16, 1987; Jersak Hills, NE, 140 m, November 27, 1987.

Stigmidium beringicum Zhurb. & Triebel

On *Stereocaulon glabrum*: KING GEORGE ISLAND, Admiralty Bay: Creeping Point, NW, 110 m, January 25, 1988.

Stigmidium fuscatae (Arnold) R. Sant.

On *Acarospora badiofusca*: KING GEORGE ISLAND, King George Bay: Lions Rump, 60 m, January 18, 2009.
On *A. macrocyclos*: PENGUIN ISLAND, above Crater Lake, SE, 40 m, January 26, 2009.

****Stigmidium placopsiicola*** Alstrup & Olech, sp. nov.

Ascomata sessilia vel semi-immersa, sparsa, nigra, 70–85 µm diam. Hamathecium nullum. Asci clavati, K tractati Lugol + aurantiaci, 42–50 × 15–17 µm magni, tholus manifestis, 8 spori. Ascosporae ellipsoidae, apicibus rotundatis, hyalinae, 1 septatae, ad septa constrioctae, guttas olei foventes, interdum triseptatae apparentes, cellulis superrioribus inferiors diam. superantibus, 16–19.5 × 4.5–5.5 µm magnae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Belweder, 190 m, on *Placopsis contortuplicata*, December 27, 1987, M. Olech (KRA-holotype). Paratype, on *P. contortuplicata*: KING GEORGE ISLAND, Admiralty Bay: Precious Peaks, S, 210 m, December 29, 1987 (C).

Ascomata sessile to semi-innersed, dispersed, black, 70–85 µm diameter. Asci clavate, KI+ orange, 42–50 × 15–17 µm, with distinct tholus. Ascospores eight, ellipsoid with rounded ends, one-septate, constricted at septum, with oildrops and appearing three-septate, the lower cell narrower than the upper one, 16–19.5 × 4.5–5.5 µm.

Other material: on *Placopsis*: KING GEORGE ISLAND, Admiralty Bay: Jersak Hills, 150 m, January 12, 2006.

Stigmidium pumilum (Lettau) Matzer & Hafellner

On *Physcia caesia*: (Marie Byrd Land, Ford Range, Skua Gull Peak).

Stigmidium sp. 1.

On *Lecania brialmontii*: asci obovate, 40–47 × 15–18 µm, eight-spored. Ascospores three-septate, 13–15 × 3–4 µm. Hymenial gelatine KI–, ascal cytoplasma KI+ orange. KING GEORGE ISLAND, Admiralty Bay: Creeping Point, 110 m, January 25, 1988.

Stigmidium sp. 2.

On *Peltularia austroshetlandica* (syn. *Parmeriella a.*): asci ca. 22 × 10 µm, eight-spored. Ascospores one-septate, 12.5–14 × 3.5–4 µm. KING GEORGE ISLAND, Admiralty Bay: Dutkiewicz Cliff, N, 60 m, August 29, 1987.

****Taeniolella frigidae*** Alstrup & Olech, sp. nov.

Taeniolella pertusariicolae D. Hawksw & H. Mayrhofer affinis, conidiis 12–20 × 10–12 µm magnis, plerumque 1 septatis, cellulis terminalibus paulo angustioribus ab ea diversa.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Demay, 110 m, on *Ochrolechia frigida*, December 10, 1987, M. Olech (KRA-holotype). Paratype: KING GEORGE ISLAND, Admiralty Bay: Blue Dyke, 120 m, on *O. frigida*, December 11, 1987 (C).

Differs from *T. pertusariicola* in conidia being mostly one-septate with the terminal cell being somewhat narrower at the top, 12–20 × 10–12 µm.

****Tetramelas caloplacae*** Alstrup & Olech, sp. nov.

Ascomata per thallium hospitis sparsa, raro in apotheciis, persistenter marginata, discis planis vel subconvexis. Hymenium circiter 75 µm altum, J+ caeruleum. Paraphyses circiter 1.5 µm crassae, cellulis apicalibus 4.5–6 µm diam., fusco-calyptratis. Asci late ellipsoids, in hymenio 65–70 × 14–16 µm, in contuso 50–55 × 24–26 µm magni, octospori. Tholus J+ caeruleus. Ascosporae ellipsoids, 1 septatae, fuscae, 15–19 × 8.5–10 µm magnae, parietibus aequicrassis indutae.

Type: South Shetland Islands, KING GEORGE ISLAND, Admiralty Bay: Sphinx Hill, NE, 5 m, on *Caloplaca sublobulata*, August 8, 1987, M. Olech (KRA-holotype). Paratypes, on *C. sublobulata*: KING GEORGE ISLAND, King George Bay: Cape Lions Rump, 10 m, January 18, 1988; 5 m. KING GEORGE ISLAND, Admiralty Bay: Krzesanica, April 18, 1987 (C). LIVINGSTON ISLAND, Ballester Point, 5 m, January 3, 1988. DECEPTION ISLAND: ridge above Emerald Lake, December 28, 1986.

Ascomata dispersed on host thallus and apothecia, sessile, black, 0.3–0.5 mm in diameter. Margin persistent, disc flat to slightly convex. Hypothecium black. Hymenium hyaline, ca. 70 µm high, I+ blue. Paraphyses ca. 1.5 µm thick, with enlarged and brown-capped apical cells 4.5–6 µm diam. Asci broadly ellipsoid, 65–70 × 14–16 µm when measured in hymenium, 50–55 × 24–26 µm in squah mounting. Tholus I+ blue. Ascospores eight, ellipsoid, uniseptate, dark brown, spore-wall of even thickness, 15–19 × 8.5–10 µm.

The species is a parasymbiont not causing discoloration or other damage to the host.

Thelocarpon cyaneum Olech & Alstrup

On *Polyblastia gothica* Th. Fr. Localities reported by Olech [6].

Tolypocladium ovalisporum (C. Möller & W. Gams) C. A. Quandt, Kepler & Spatafora (C. Möller & W. Gams) C. A. Quandt, Kepler & Spatafora (syn. *Chaunopycnis ovalispora* C. Möller & Gams)

Isolated and described from *Gondwania regalis* (syn. *Caloplaca r.*) from King George Island (Möller & Gams 1993).

Weddellomyces gasparriniae (C. W. Dodge) D. Hawksw. & Iturr.

On *Caloplaca*: (Macquarie Island, north end of island).

Verrucaria congestula Stirt. ex Cromb.

On *Placopsis macrophthalma*, (Kuerguelen Island, Moseley).

Zwackhiomyces cladoniae (C. W. Dodge) Diederich

On *Cladonia mawsonii*: (Macquarie Island, north end).

Zwakhiomyces lecanorae (Stein) Nik. Hoffmann & Hafellner.

On *Candelariella aurella*: KING GEORGE ISLAND, Admiralty Bay: Barrel Point, 30 m, February 21, 1987.

Zwackhiomyces martinatianus (Arnold) Tribel & Grube

KING GEORGE ISLAND, Admiralty Bay: Upłaz, 50 m, on *Porpidia submelinodes* Osyczka & Olech, February 13, 1990.

Discussion

In the present study, 96 species of lichenicolous fungi are reported from the South Shetland Islands, with 73 of these reported from King George Island, which is the largest island in this archipelago. The highest numbers of lichenicolous fungi were observed on *Lecanora* and *Placopsis* (10 species), *Ochrolechia* (eight species), *Cladonia* and *Pertusaria* (seven species), *Caloplaca* (six species), *Acarospora* and *Buellia* (five species) (Appendix S1). Nevertheless, the lichenicolous fungi represent variable life strategies. The majority of the lichenicolous fungi found in this study are obligatory or facultative parasites, and only some are saprophytes or parasymbionts. Some of the lichenicolous fungi are associated with only one specific host species (e.g., *Phacopsis usneae*), and others may occur on different lichen taxa (e.g., *Sphaerellothecium cladoniae*) [6].

Although lichenicolous fungi are widely distributed in polar regions, they are usually overlooked due to the difficulty in identifying species, and the need to identify their hosts first. Additionally, collected specimens are often too small or immature for precise identification. In the study area, unidentifiable black hyphae on host thalli were very

common on many lichens, and unidentified *Stigmidium* species were also found during the laboratory analyses. We, therefore, expect that many more species may be found in the Antarctic. The relatively high number of new lichenicolous species described in the present study, as well as records of new hosts of species already known, seems to confirm this statement. The richness of lichenicolous fungi in the Antarctic region is still insufficiently studied in comparison to the Arctic, where some 250 lichenicolous fungi are currently known [28]. In Antarctica, of all the reported species, only 34 are known to have a bipolar distribution.

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Supplementary material

The following supplementary material for this article is available at http://pbsociety.org.pl/journals/index.php/asbp/rt/suppFiles/asbp.3607/0:

Appendix S1 Host genus index for lichenicolous fungi known from the South Shetland Islands.

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